The Seed Resilience Project

A Tasmanian Landcare Initiative

sketch by John Black

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Introduction

This report is a summary of the problems and solutions with native seed supply in Tasmania. It contains background information on the national native seed sector, a summary of the issues in Tasmania, examples of seedbanks from other states and a conclusion on how to improve the seed supply in Tasmania. This report is part of the seed resilience project funded by Landcare Tasmania in response to the decreasing availability of native seeds and plants to Landcare groups and projects.

The diverse landscape of Tasmania gives it its character, and also influences how we operate as a community. We tend to divide into regional areas according to geography. Because of this, the native nurseries in each region are significant repositories of local native plants and knowledge. Over the last few years it has been evident that a succession plan is needed to ensure the ongoing supply of a diverse range of native plants for Landcare groups, councils, community organisations and individuals across the state. An ongoing supply of native plants relies on an ongoing supply of native seeds.

The most important factor in the supply chain for native seeds is the seed collector. A capable seed collector has experience in locating accessible sites for certain species, knowledge of seasonal seed ripeness, and training in botanical identification. Also, an understanding of the principles of seed collection, such as genetic mix, minimising damage to vegetation, and obtaining permits.

Following collection, good seed cleaning and storage facilities are required to ensure maximum viability of seed stocks. For seeds to be available for others through exchange or sale, seed lots need to be entered onto a spreadsheet or database with basic details such as species name, location and date of collection, and extra information like the number of mother plants, patch size and vegetation type. To ensure good quality seed stock there needs to be batch control tracking and germination testing.

There is an increasing demand for native seed with growing appreciation in the value of native vegetation. Native plants are required for carbon offset planting, in bushland areas for habitat regeneration, in coastal and riverine sites for erosion mitigation, on farms as shelterbelts and for grazing, and in urban areas for horticulture value in gardens and landscape designs.

The outcome of the Seed Resilience Project is to increase the availability and diversity of native seeds, and therefore native plants, to nurseries, organisations and individuals in Tasmania.

Background

Seed Surveys and Strategies

The Australian Network for Plant Conservation (ANPC) published the results of a survey into the native seed sector in 2020.[1] The most important issues that came out of the survey were:

- Future demand for seed will be difficult to meet from wild harvest;
- The market is unwilling to pay for the true cost of seed collection/seed production;
- There is a lack of seed available from a broad range of species; and
- Demand for seed is inconsistent and/or unpredictable.

It found that one of the reasons underlining these issues in native seed supply is the ad hoc nature of the sector, without a peak body to represent and improve the industry.

There was peak body for the seed collecting sector in the 1990's, called the Florabank program. It was funded by the Federal Government's National Heritage Trust program as a collaboration between CSIRO, Greening Australia, Australian National Botanic Gardens, Australian Centre for Mining Environmental Research, and the Nursery Industry Association of Australia.

The establishment of Florabank came about through a need for good quality seeds to supply large revegetation projects, with the training course for seed collectors partially funded by the Wimmera catchment management authority. Florabank provided online resources plus an accredited and highly regarded seed collector training program. Today Florabank exists as an historical web-based resource managed by Greening Australia.[2]

The ANPC survey respondents were mostly from NSW and the ACT (41%), followed by Victoria (30%) , WA (14%) with a small number from other states, including Tasmania. Therefore, some of the issues are more relevant to mainland Australia. Mainland Australia has a greater need for broad acre restoration requiring large quantities of seed for direct seeding. It can be difficult in some states to harvest large quantities of seed due to the fragmented state of the natural vegetation. Seed production Areas known as 'SPAS' have been developed to counteract this problem

The report found that a key risk was the knowledge gap in forecasting seed supply and demand beyond a very short time-span of 1-2 years. This means that there is a risk of seed supply limiting the capacity to restore large areas of land should additional funding become available or to rapidly respond to natural disasters.

Seed collectors responding to the survey felt that the ad hoc approach to seed orders meant that they collected opportunistically with considerable financial outlay for seeds that may

[1] Hancock, N., Gibson-Roy, P., Driver, M. and Broadhurst, L. (2020). *The Australian Native Seed Sector Survey Report*. Australian Network for Plant Conservation, Canberra.

[2] https://www.greeningaustralia.org.au/publications

not be required. A fair price for seeds needs to reflect this risk. Suppliers should sell seed at a price that reflects experience and expertise, equipment, processing, storage and testing of seed lots. The ANPC survey respondents overwhelmingly supported the formation of a representative industry group to develop best practice protocols or standards for issues such as seed collection, seed storage, seed testing, seed labelling and buying practices.

After the devastating bushfires of 2019-20, Greening Australia published a *Strategy for the Australian Native Seed Sector* [3] as part of their Project Phoenix program, funded by the Federal Government
The strategy has six objectives as follows:

1. Quality: To agree on, promote and actively adopt one 'living' set of national best practice standards (or code of practice) and functional data systems for (possibly voluntary) use across the sector.
2. Market Coordination: To enable the native seed sector to improve coordinated market decisions by better sharing market-based information and connecting organisations and networks.
3. Information sharing: To support the native seed sector through access to new and existing knowledge that is readily available, accessible and practical.
4. New industries: To foster the growth of new and emerging industries to increase economic activity.
5. Smarter regulation: To better protect threatened species, biodiversity and land tenure while improving access (supply) through smarter regulation.
6. Sector leadership: To develop a single voice for coordinated action for the native seed sector to ensure strategic leadership and foster its future growth and development.

The strategy suggested development of standards for seed collections, that are based on revised florabank guidelines, which can be found on Greening Australia's website. ([4]). Greening Australia does not provide a leadership role to implement the *Strategy for the Australian Native Seed Sector*. It has focused efforts in regard to the strategy by setting an example of best practice at its seed supply business Nindethana in Western Australia.

Established Seedbanks

Tasmanian Seed Conservation Centre

Tasmania has a seed bank facility at the Royal Tasmanian Botanical gardens in Hobart. This is the Tasmanian Seed Conservation Centre (TSSC), established in 2005 by the millennium seedbank project at Kew Royal Botanical Gardens in the United Kingdom. Seeds are collected with the primary aim to conserve species in perpetuity, with a backup collection kept at Kew seedbank. The information on seed germination requirements are published online[5] and provide an invaluable reference to others in the sector.

[4] https://www.greeningaustralia.org.au/?s=florabank
[5] https://gardens.rtbg.tas.gov.au/conservation/tsccgerminationdatabase/

The standard of seed collection, extraction and storage at the TSSC , including the recording of metadata with each batch, provides a gold star example of seed collecting and storage for the establishment of other seedbanks in the state.

Seeding Victoria

Seeding Victoria[6] services central, south west and western Victoria. It has grown from the Ballarat Region Seed Bank, established in 1994 at the Victorian Landcare Centre at Creswick. It changed its name in 2009 to Seeding Victoria, and now hosts the Murray Mallee Seedbank and the Wimmera Region seedbank. This centralisation of smaller regional seedbanks into one large seedbank gives an economy of scale, to cover the costs of staff wages and the cost of cleaning, drying and storage equipment.

The key to the success of this seedbank is connecting with larger organisations and projects so seed supply can be anticipated. Seedbank staff provide other services besides seed supply and storage, including assessment of seed requirements for large projects, and the provision of training programs on seed collecting.

Seed Collectors are registered with the seedbank and must collect to a certain standard before the seed is accepted. Seed is given a batch number and sold on consignment, with collectors paid twice a year. When there is a predicted large seed demand, the seedbank is funded to run training programs to skill-up collectors. At present the Victorian Government is investing $30.9 million in the Bushbank Program to revegetate and restore at least 20,000 hectares of native habitat across private land in Victoria. Seeding Victoria has been funded from the Bushbank program to run training sessions to upskill seed collectors so there is enough seed supply for the program.

South Gippsland Seedbank

The South Gippsland seedbank, also established in 1994, is a not-for-profit organisation with a paid manager and volunteer helpers. Seed is purchased from collectors. It provides advice on the best technique for direct seeding, and has a Rippa Seeder for hire. A direct seed mix will cost about $75/100g with 2 kg recommended per hectare ($1,500)

The Goulbourn-Broken Indigenous seedbank

The Goulbourn-Broken Indigenous seedbank is part of the Euroa Arboretum, a not-for-profit organisation. It services the area with local provenance seeds, with about 30% of seed going to nurseries and 70% for direct seeding. Two fulltime staff members are employed as field officers and in the seedbank. There are several streams of funding to support the seedbank including grants, nursery sales, as bush crew and seed sales. The seedbank is located on a rehabilitated bush property, with an interpretation trail encouraging visitors to learn about indigenous culture.

The business plan[7] states that there is an ‘unquenchable demand’ for indigenous plant species and seed. However at present, the cost doesn’t reflect the effort to collect, harvest

[6] https://www.seedingvictoria.com.au/

[7] http://euroaarboretum.com.au/ Eurora Arboretum Business Plan 2022-2025

and process the seed. Seed businesses in Northeast Victoria are not running as commercially sustainable businesses at present, a situation which needs to change in order to supply the future demand of seeds. One of the planned strategies to increase income for this seedbank is the development of seed production areas supported by business partners.

Methods/Results

As part of the Seed Resilience Project, Landcare Tasmania held several forums and conducted a survey to canvas the issues around native seed supply in Tasmania.

Online Forum

The first forum was conducted as an online discussion on the 6th of September 2023, with key panellists from different parts of the native seed sector. The panellists were James Wood from the Tasmanian Seed Conservation Centre, Herbert and Sally Staubmann from Habitat Nursery, Dan Frost from Seeding Victoria and Ruth Mollison from Island Seeds. Panellists addressed set questions on seed supply issues then others were invited to join in and ask questions.

The discussion bought up several topics including:

- Germination Testing: Research based germination testing at the Tasmanian Seed Conservation Centre is useful for deciding which species may be candidates for direct seeding, and for general nursery propagation. This information is updated yearly and freely available to the public on the Tasmanian Seed Conservation Centre website.
- Seed production Areas: Seed production areas aren't just for large quantities of seed for direct seeding purposes. They are also useful for species where for various reasons, it is difficult to collect quantities of seed in the wild. Florabank has guidelines for stablishing seed production areas.
- Seed Availability: It is difficult to get seed with the right provenance and mix around the state. Pooling the resources of organisations, such as Landcare Tasmania, NRM groups and the TFGA would give enough impetus and resources to support a Tasmanian seedbank with professionally trained and funded staff. It is too important a service, where consistency and quality is required, to rely on volunteers to run a seedbank.
- Provenance as a concept: Climate change is causing a change in attitude to local provenance planting. It may be that for the future survival of planted areas, provenance is extended so species have resilience to climate changes.
- Seed Collecting: A price structure needs to be set for seed collectors, as well as access to good quality training. Seed should be processed from collecting to storage in ten days for maximum viability.
- Communication Framework. A Facebook group was started from this discussion, for the exchange of information on seed availability and ripeness etc.

Conference Discussion

A second forum titled the *Tasmanian Seed Resilience Network* was held at the state Landcare Conference in October 2023, at Spring Bay in Triabunna on the East Coast. Panellists James Wood from the Tasmanian Seed Conservation Centre, Andrew Stevenson from Wildseed Tas and Herbert Staubmann from Habitat Plants, lead the discussion with their insights into the Tasmanian native seed sector.

The discussion is summarised as follows:

- Supply Issues: Large mixed nurseries are finding it hard to source quantities of native seed, as it is too time consuming for these nurseries to collect native seed themselves. It is reducing the number and variety of Tasmanian plants available for purchase.
- Training: There is a need to have trained seed collectors in Tasmania, with a background knowledge of guidelines for good quality seed. It is important for seed to be of good quality, with genetic diversity, and cleaned and stored properly to maintain viability. The experienced seed collectors on the panel emphasized the hard work and time that needs to be put in to becoming an experienced seed collector, with a willingness to collect at the time of year when most people are on holiday between Christmas and New Year.
- Planning: It's not just seed collectors that need training. Those involved in planning revegetation projects (NRM groups, mining companies, government departments, large landowners) need to understand the effort and time required to collect the diversity, quantity and provenance of seeds for projects. Poor planning is frustrating and results in less diversity and quality of species available for projects.
- Access: The difficulty of wild seed collecting, with restricted access to collecting areas in regrowth areas of forestry coupes and permits taking longer to obtain. It was noted that there has been a decline in wild seed stocks. This may be from climate change with a disconnect between pollinators and plants flowering times. As well, there is a need for better fire management to reinvigorate fire dependant vegetation.
- A future seedbank: The nature of a Tasmanian seedbank was discussed. One model suggested was regional with local groups/regional stores rather than a central seedbank, with a central data base that links collections. It would be necessary to standardize quality controls in collecting and storage. Another model is a central seedbank established with a coordinated and cooperative effort from NRM, Landcare Tasmania, TFGA, CSIRO, UTAS, Hydro Tas and Tafe. The seedbank is primarily to provide high quality seed for seedling production for the major landscape restoration projects in the rural/peri-urban areas i.e., landscapes that have been disturbed/modified by 'agricultural'/ settlement activities. Seed for seedling production should be the primary goal – seed for direct seeding a secondary goal (as the seed quantities required for direct seeding are much higher).

Survey

Landcare Tasmania conducted an online survey between August and October of 2023, on the issues around seed supply.

There is interest and a good baseline level of knowledge in sections of the community with 34 respondents completing the survey.
Over 40% of respondents had education or training in botany or horticulture. The other respondents had either work experience or first nations knowledge of native vegetation. (Figure 1.).

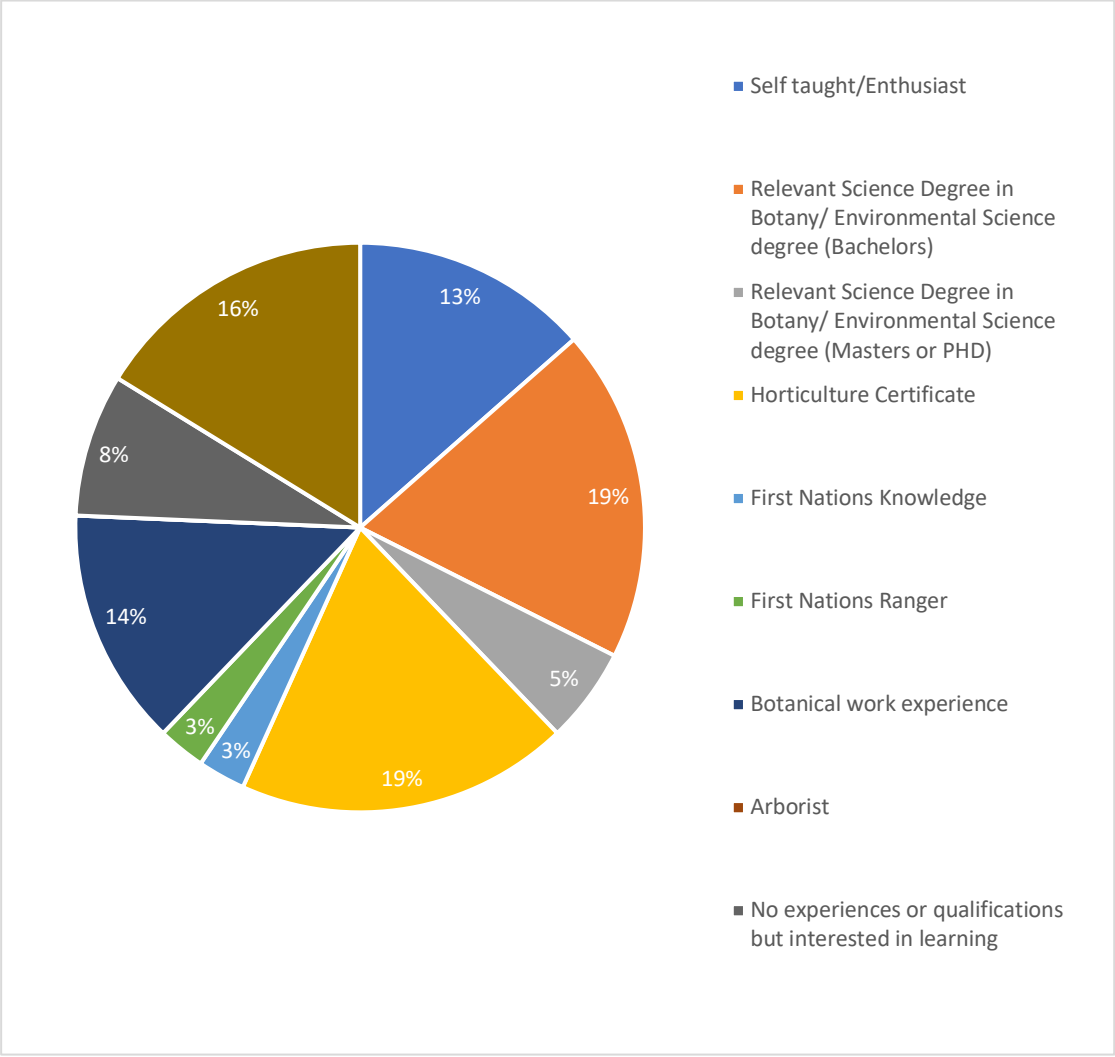

Figure 1. Background of respondents to the Online survey

The survey asked a range of questions including '*Do you need further training in seed collection'.* The majority of respondents indicated they would like further training, and that there was a lack of seed collectors. Most of the respondents collected seed for growing their own plants for non-commercial purposes and considered local provenance an important factor in seed collection.

Respondents rated the dominant issues facing the seed sector as a lack of seed collectors, difficulties in obtaining permits and seed prices not reflecting the true cost of collecting. These issues were reiterated at the conference forum.

Conclusion

It is clear from the feedback from the Landcare Tasmania seed resilience project that Tasmania needs a seedbank where high quality native seed is available for tubestock and direct seed sales. This needs to be bought to the attention of government departments, NRM organisations, councils and corporations involved in planning or implementing revegetation projects.

The risks if a native seedbank is not developed are:

- The demand for native seed will outstrip supply.
- Limited availability of good quality native seed with suitable provenance will compromise the ecological values of revegetation projects.
- Buyers will substitute mainland species for Tasmanian species, with a subsequent loss of genetic integrity and the risk of introducing weedy opportunistic species.
- Home gardeners will purchase exotic rather than local species, if native plants aren't propagated in the larger nurseries.

Solutions

The need for better access to good quality native seed is a common need across many organisations involved with planning and implementing revegetation projects. As a small island, Tasmania is well placed to form partnerships between organisations, councils, and government bodies across the state. A governance body with representatives from each organisation could be established to oversee a state seedbank. The synergy between these organisations would achieve a great outcome in developing a native seed bank.
The first priority in developing a seedbank is employing and supporting trained staff, this is underlined by the presence of paid staff in each of the Victorian seedbanks. Volunteers also play an important role such as seed extraction, which can be very labour intensive.

The resources needed for a state seedbank includes:

- Employment support for permanent paid staff.
- Office space with laptops, mobile phone and printers.
- Access to a field vehicle for seed collecting.
- Seed collecting equipment and field safety PPE and first aid kit.
- Drying igloos and pest-free shed space for seed lots.
- Cleaning areas with sieves and winnowing machines.
- Storage areas in a cool room with humidity controls.
- Germination testing areas and lab space for seed viability testing.
- Training room for running courses in seed collecting.

A decision needs to be made about the advantages of developing several regional seedbanks, perhaps with a central database, or one central seedbank. Seeding Victoria hosts several regional seedbanks with their own collections in their facilities. This works as an economy of scale where expensive equipment such as winnowing machines, incubators and

cool storage facilities can service a large area. As well as a paid manager, training programs for seed collectors are required, to ensure quality collections need to occur.

With the major organisations working together to support a seedbank and manager, there can be a strategic and timely approach to supplying seed for major projects. Seed collection and collectors can be targeted in certain areas to supply upcoming revegetation projects.

Further Work

The next step in establishing a seedbank is for a lead organisation to identify and approach organisations, corporations, councils and NRM bodies that have an interest in establishing a seedbank. A business plan for a seedbank needs to be drawn up, with a staged timeline towards commercial sustainability. A partnership between organisations in investing in a seedbank, will lead to a more efficient supply and demand connection between buyers and suppliers. It will also be a conduit for passing on research and knowledge to those in the field, and for setting seed collecting guidelines.