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## Introduction

Over the past decade the importance and benefits of growing plants from locally sourced seed for revegetation projects has been emphasised. The reasons for this are numerous, not the least of which include preservation of local plant populations, their genetic integrity and habitat for indigenous fauna.

Over the same period of time, the amount of indigenous seed collected by seed suppliers, nurseries and private landholders has greatly increased. As a result, we now need to monitor and control the collection of seed from remnant vegetation. If too much seed is collected from a plant community, the plant species collected may become threatened or the regeneration of collected species may be reduced to the extent that the ecology of the plant community is altered. Currently, a seed collection licensing and recording system is controlled by the Department of Natural Resources & Environment (DNRE), to manage and monitor seed collection activities across the state.

A critical issue in collecting indigenous seed for revegetation projects is timing. Different species will vary in their fruiting season and this, along with the time required for collection, cleaning, germination and plant growth, need to be factored into the timing of revegetation activities. The following sections detail the principals and processes involved in collecting, cleaning and storing indigenous seed for revegetation projects.

## Recognising mature fruit and seed

It should be pointed out that seed collection in practice often involves the collection of ripened fruit containing seed, rather than collecting the seed directly. Many fruit types

of plants open up at maturity to disperse the ripe seed contained within. Seed collection therefore, needs to involve monitoring the ripeness of plant fruits so that fruit can be collected before the ripe seeds are released.

With eucalypts, a useful indicator of fruit maturity is when the eucalypt capsules (i.e. gumnuts) begin to open or darken in colour. However, some eucalypts – the Manna Gum (*Eucalyptus viminalis*) for example, have fruit which is usually still green at maturity, but with the valves of the gumnut being well formed and beginning to separate. If in doubt as to whether capsules are ready for collection, it is best to examine the seed within. To do this, cut the fruit length-ways with a pair of secateurs and examine the seed present. If the seeds are blackish in colour they are mature, and the fruit is ready to collect. River Red Gum (*E. camaldulensis*) is a notable exception to this rule. Fertilised River Red Gum seeds are lighter in colour when they are ready to be taken. Recently formed immature fruit frequently occurs on the same tree as mature fruit, so care must be taken to leave the immature fruit behind.

When collecting grasses, it is a good idea to locate the actual seed contained within the seedheads to confirm seed is still present and well formed. It is particularly important to carry out this inspection with species such as Weeping Grass (*Microlaena stipoides*) and Silver-top Wallaby-grass (*Joycea pallida*). As a general rule, if the grass seed is thin, pale or green it is immature and not yet ready, but if it is dark and plump it is mature and appropriate to collect. Sometimes, the seed appears ripe by it's dark colour, yet feels hollow when squeezed. When ripe seed is squeezed or pinched between finger nails, it should contain a milky, starch-like substance which is essential for the seeds viability.

A common difficulty experienced during the collection of many native species (e.g. Sweet Bursaria – *Bursaria spinosa* ) is that different clusters of fruits mature at different times. Several seed collection visits may therefore be required to successfully collect the quantity of seed required.

Some species, such as members of the 'pea' family (Fabaceae), can mature and release all their seed in a matter of days (particularly in hot weather). When collecting such species, a bag of stocking-like material can be placed around the pods shortly before maturity, to capture the seed when the fruit opens.

## Collection

Simple methods of seed collection include:

- 1 using pole pruners to remove fruits or fruiting branches from trees and tall shrubs
- 2 using secateurs for grasses and lower shrubs
- 3 hand picking of individual fruits where appropriate (e.g. fleshy-fruited species)
- 4 placing a ground sheet underneath a shrub and then shaking the plant to dislodge pods and seed. This method is particularly useful for prickly or tall shrubs, or plants that have small fruit which can be very time consuming to collect individually.



**Figure 1** Collection of *Acacia* seeds using an efficient and comfortable cloth bag.

Freshly picked seed and fruit is best placed in breathable collection bags, i.e. not plastic. Paper bags or grain feed bags are excellent for this purpose, but do not use cloth bags when

collecting grasses as the seed tends to get caught in the material.

Where continuous stretches of indigenous grasses occur, a brush harvester, (e.g. attached to a four wheel drive) can be used. A small scale brush harvester fitted to the end of a hand-held brushcutter can also be used where the grasses have a more patchy distribution.

To ensure the seed collected is as genetically diverse as possible, small quantities of seed should be collected from as many different individual plants as possible taking into account any constraints of the permit. This simple criteria helps ensure the greatest generic representation of the species in future generations. Similarly, collecting from as many different heights on plants as practical, is another simple practice which increases the genetic 'worth' of seed collected. Genetic diversity in seedlots help plant populations survive changes in environmental factors they may experience in the future. Likely environmental stresses plant populations need to endure include: disease and insect attack, change in soil conditions and change in fire regimes.



**Figure 2** Brush harvester collecting *Kangaroo Grass* on a large scale.

If the identity of the plant is in doubt, a plant sample should be taken to confirm the identification of the collected species. Ideally plant specimens for identification should include as many parts of the plant as possible or written descriptions of these parts (adult and juvenile leaves, buds, flowers, fruit and bark type for trees and shrubs, and for grasses and rushes, a specimen of the whole length of the plant, from the base to flower head).

## Ethics

To ensure that the species you want to collect from is not threatened through over harvesting, certain conditions as required by the permit, must be observed.

These include:

- 1 No seed or propagation material is to be taken from small populations (i.e. less than 10 individuals for trees and shrubs and fifty individuals for herbs and grasses).
- 2 A maximum of 10% of seed in a population can be taken.

If the opportunity arises, it is a good idea to collect from remnants that are to be destroyed (e.g. on surveyed roadwork sites) or to collect in association with power line clearance works. Collecting from existing revegetation sites (assuming the seed was locally sourced), also reduces the seed collection pressure on remnant vegetation. Care must be taken to minimise disturbance when collecting seed, particularly in regard to:

- 1 trampling of understorey vegetation, especially in wetlands.
- 2 collection of excessive amounts of vegetative material, including buds and immature fruit, and
- 3 vehicle disturbance.

## Records

Where possible, the basic aim of a revegetation project should be to re-establish the range of species that existed, or is presumed to have existed at the site before land clearance occurred. For the re-established plant community to have best genetic representation of the original, only locally sourced plant material should be used.

An exception to this practice would be where an attempt is made to save a species from regional extinction. Taking this into account, it is important to collect from remnants which have similar geology, soil type and vegetation community to those at the site which you are trying to revegetate.

Ideally when collecting seed, these factors should be recorded, particularly if more seed is collected than is immediately required. If seed is to be stored for future revegetation projects, it is particularly important to record a map reference for the collection site (e.g. AMG, longitude & latitude, or VicRoads map reference), to assist in defining the appropriate future use of surplus seed. Indigenous seed for revegetation is a finite resource. Seed without collection information as well as species details, is of little value for revegetation work.

## Provenance

Environmental factors (and site information) recorded when collecting seed, help define the 'provenance' of a seedlot. The word 'provenance' refers to the location from which seed has been collected and thereby defines any local variation within the seed, even though the variation may not be readily apparent in the parent plant. In terms of revegetation projects, provenance is a very important issue. For example, River Red Gums from the Swan Hill region have different characteristics to those found near Nagambie. If Red Gum seed used for a revegetation project near Nagambie was of the Swan Hill provenance, the potential for the introduced population to cross pollinate with local remnants could alter the genetic integrity of those remnants. Such genetic changes may have deleterious ecological implications.

## Seed extraction

In most situations, it is the fruit, not the seed, of plants which is actually collected from the field. The process then is the extraction of the seed from the mature fruits, after collection. Seed cleaning (extraction) techniques vary according to species. Woody capsules should be stored in a warm, dry place until the valves open and the ripe seed is released. The time taken for drying and opening of capsules varies between species. The seed can then be sorted from the foliage pieces, fruiting bodies and chaff.

Some grasses (e.g. Wallaby-grasses, *Austrodanthonia* spp. and Tussock-grasses, *Poa* spp.) can be cleaned by rubbing the

seedheads between horse grooming gloves. Kangaroo Grass (*Themeda triandra*) can be cleaned by rubbing the seedheads over flywire with a collection bucket underneath. Alternatively, large collections can be sent to a mechanised grass cleaning operation. Highly cleaned seed is required for mechanised seeding used in large scale plant establishment.

Seed from species such as Weeping Grass (*Microlaena stipoides*), Windmill Grass (*Chloris truncata*) and Spear-grass (*Austrostipa* spp.) can all be collected by directly hand picking the seed from the fruiting grass heads at the time of collection.

Species that produce seeds in pods, e.g. wattles (*Acacia* spp.) or soft capsules, e.g. mat rushes (*Lomandra* spp.) can again be cleaned by a combination of horse grooming gloves, sieves and winnowing.

For fleshy fruited species such as Flax Lily (*Dianella* spp.), it is generally advisable to soak the fruit in water over a number of days, until mould growth occurs, and then use a combination of sieves and water to extract the seed from the fruit pulp and skin.

A range of different sieve mesh sizes is required if large quantities of many species are to be cleaned.

To kill mites and other insects in seed lots, pest strips or toilet cubes (para dichlorobenzene) can be used. Insecticidal dusts are not recommended as they cannot be removed from the cleaned seed and potentially may affect germination.



**Figure 3** Seed cleaning made easy using sieves.



**Figure 4** Long-term controlled storage at one of Greening Australia's seedbanks.

## Storage

Seed viability (or the seeds ability to germinate) is dependent upon many different factors. The level of maturity of the seed at the time of collection, the storage conditions in which the seed is placed, and age of the seedlot will all affect seed viability. To maximise viability, seed should be dried and cleaned before storage and stored in an airtight container at around 4°C. The low temperature increases the longevity of the seed for many species. Cool storage is particularly important with soft-coated species such as grasses and daisies which rapidly lose their viability if left at room temperature.

## Permission

The Department of Natural Resources and Environment (DNRE) administers 'Permits to Take Protected Flora from Public Land/Waters.' A permit must be obtained for all seed collections from public land. An additional permit must be obtained to collect from species and communities listed under the *Flora and Flora Guarantee Act 1988* (which is continually updated). These include Victorian Rare or Threatened species (VROTS), orchids and threatened communities.

A separate permit is required to take any flora from areas managed under the provisions of the *National Parks Act 1975* (National Parks, State Parks, Wilderness Parks and other parks and reserves), or from Reference Areas under the *Reference Areas Act 1978*.

Additional to these permit requirements, permission must be obtained from the land manager of the collection site.

Permits are co-ordinated by the Department's Melbourne office and can be obtained by contacting :

Scientific Permits Officer  
Dept of Natural Resources and Environment  
30 Prospect St  
Box Hill VIC 3128  
Phone : 03-9296-4400  
Fax: 03-9890-0075

***For further information with regards to seed collection practices, please contact:***

Greening Australia (Victoria) Regional Facilitator  
David Millsom  
"Mt Hope"  
via Pyramid Hill  
VIC 3575  
Phone/Fax 03-5455-7458

Greening Australia (Victoria) Regional Facilitator  
Liz Raven  
Greening Australia  
P.O. Box 804  
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Vic. 3672  
Phone:03-5762-7777

Seedbank Co-ordinator – Riverina  
Sue Logie  
Greening Australia  
PO Box 1010  
Deniliquin  
NSW 2710  
Phone 03-5881-3429  
Fax 03-5881-3412

Mechanical Grass Seed Cleaning:  
Rob Mezzini  
Creswick  
Phone:03-5345-6340  
Fax: 03-5345-6490

Standard Guidelines for Seed Issues:  
Website: [www.florabank.org.au](http://www.florabank.org.au)

Greening Australia Seed Supply System Database Software:  
John Horlock  
Greening Australia Victoria, Head Office  
Phone: 03 9457 3024  
Fax: 03 9457 3687  
Email: [JHORLOCK@gavic.org.au](mailto:JHORLOCK@gavic.org.au)

## References and further reading

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