Seed Collection from Native Trees & Shrubs

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This paper briefly describes the methods for collection, cleaning and storage of seed of common species found in the SW region of Victoria. The genetic situation is complex, with issues of self-incompatibility, selfing, out-crossing, hybridisation, small populations, isolation, lack of certain pollinators and other factors variously involved with different species. Collected seed may be used for direct-seeding or for propagation of seedlings in containers.

General 'rules'

Preserve the resource − do not collect all of the available seed at the site or more than is needed. Greedy and thoughtless collectors can inflict substantial damage on roadside vegetation − this must be avoided.

Avoid self-pollinated trees − when collecting seed be aware that self-pollination will occur in individuals that are isolated − this invariably leads to seedlings that have diminished vigour, although this may not be evident if there are no out-crossed seedlings to compare with. If possible, avoid collecting seed from an isolated tree which is more than about 200 m from another isolated tree of like species. Exceptions may be species such as *Allocasuarina verticillata* which are wind-pollinated over long distances. Other exceptions occur in situations where honeyeaters cover distances of several km between tree sites and transfer pollen in doing so.

Maximise genetic diversity − the aim is to collect seed from within a stand of trees that have been exposed to substantial cross-pollination by insect, bird, mammal and wind agents. Of course it is not always possible to collect from within a clump but be aware of the possible consequences of in-breeding (e.g. reduced seeding vigour and health of the planted trees).

It is best to collect from trees within the group that are at least 100 m apart. The aim is to try and reduce the chance of collecting from closely related individuals. The assumption is that individuals close together are likely to be more closely related than individuals which are further apart in the group. In practise it is quite difficult to stick to this guideline, particularly if the population is less than a few hectares in size or on a road or creek frontage of only a few hundred metres.

Diversity is also enhanced if seed is collected from as many trees as possible, taking a little from each tree. Try and have at least 10-20 trees represented. This will assist in maintaining a wide genetic basis for the collection. Others, including Dr Linda Broadhurst from CSIRO, would suggest a minimum of 20-30 trees are needed to cover 90% of the genetic variation in the population. There is no guarantee that the offspring from the "best" trees will be better than that obtained from the average in the stand. However, make sure that collections are not simply from the trees of poor height and low-branching habit (a tempting prospect for collectors of seed) − unless those are the characters sought!

Research has indicated that some populations in an area contribute little to pollen interchange but if the habitats look similar then collect from all.

Labels − record the name of the plant, the date and site of collection and make sure that a label containing this information is put among the collected material. The label is later transferred from the dried material into the seed container. This approach ensures that there is no confusion of seed identity.

Time and method of collection

Acacia. Wattles flower at different times of the year, some not doing so until summer. It is necessary to observe the ripening stages of each species in order to time the collection. Prickly Moses (*A. verticillata*), for example, flowers in early spring and will shed seed freely in most years in December in the Hamilton area. Black Wattle (*A. mearnsii*) will mostly shed seed in January, although the seed may persist for another month or so in the pods where trees occur in sheltered gullies. Blackwood (*A. melanoxylon*) will mostly ripen in January-February but the seed is held firmly by the reddish stalk (funicle) and may be collected many months later. Be aware, though, that weevils may have destroyed much of the seed if it is not collected promptly.

The seed is ripe when the pods turn brown and begin to open − the seed will then be firm and black-brown. Seed is best collected by hand-stripping the pods from the branches into a plastic bucket or bag. The contents are then transferred into a woolpack or other large container. Seeds may be collected from a sheet spread beneath the tree and left there until the pods ripen and the seeds are shed. Small quantities can also be collected by sieving the top layer of soil and debris beneath the tree.

Banksia. Cones should be removed by hand when they are mature. Black cockatoos usually find the cones before the seed is ripe. However, cones collected in February from Silver Banksia (*B. marginata*) that were dropped by cockatoos yielded sufficient viable seed to grow several hundred trees. In dry summers one should visit the trees in mid-January because cones dropped on the ground will have dropped most of the seed into the grass by February and will be very difficult to collect.

Another approach adopted by Bill Weatherley to collecting viable banksia seed– albeit in very small quantities – is to bag a few large cones in spring before the cockies arrive. If a fine-weave net is used then any mature seed that is shed can be collected in February, or at any convenient time. Apparently the cockies have not bothered the netted cones. However, being very intelligent birds, they may learn!

Bursaria. Sweet Bursaria (*Bursaria spinosa*) flowers over summer and will not be ready to harvest until autumn. It is necessary to watch the progress of ripening closely − most of the seed will be shed following the first period of hot and windy weather in late autumn. The capsules may be hand-stripped into a plastic bucket. A better method for a calm day and very ripe capsules involves the placing of a plastic bin or an inverted umbrella close under the seed-bearing branch − the capsules are rattled with a stick to dislodge the small plate-like brown seeds which are then caught in the receptacle. Bursaria are mostly very spiny (at Lake Linlithgow some do not bear spines) and this approach is much more pleasant than any other.

Eucalypts. Flowering may not occur annually, so there will not always be mature seed available each year. In some eucalypts the time from obvious bud development to flowering may be a year; a further year may be required for the seed capsules to ripen and the seed may be shed in the following 6 months to 5 years. When ripe the capsules change from green to a bronze colour and are usually quite a lot larger than immature capsules. Do not collect immature capsules.

Manna Gum (*E. viminalis*) and Swamp Gum (*E. ovata*) will retain some seed in the mature capsules for several years and it is often possible to collect viable seed from the tree at any visit, although the capsules may be the result of a single flowering some years ago. The same occurs with many other species. It will be obvious with some that there is a gradation in age of capsules. With Grampians Gum (*E. serraensis*), for example, the old capsules (some opened) will be found on stems perhaps 50-100 cm from the tip of the branch. Successively younger capsules will then be found towards the tips, the result perhaps from 3 or 4 years flowering. When collecting from such trees select the ripe capsules without interfering with the buds and immature capsules on the young wood.

River Red Gum (*E. camaldulensis*) tends to shed seed within 6 months of its maturation; a likely sequence is the development of flower buds in spring, flowering in early summer and seed drop follows in autumn-spring, during a warm and dry period. The onset of seed drop cannot be predicted precisely − examine the capsules from time to time to monitor development. Expect some progress during the first extended warm period.

Seed should be collected by hand-stripping capsules from branches or by cutting off small branches. The latter approach is quicker but can be destructive and wasteful of next year's crop because buds or immature capsules are also removed. Where the trees are tall this method is sometimes the only practicable way; the fruit is reached with a long pole with an attached hook or cutting implement. If the trees have been felled (*e.g.* following forestry logging or coppicing of sugar gum belts) then this is obviously of no consequence. Opportunities to collect seed should always be taken (with permission from the manager or owner) following such events. The collection needs to be made within days of falling, particularly in hot weather.

Hakea: The woody capsules bear only 2 seeds. Collect the mature capsules and put these in a hot position (near the fireplace, oven or glasshouse) to allow the seed to be released.

Melaleuca, Leptospermum and Callistemon: The mature capsules are borne on the older wood - the seed is generally retained for many years in the capsules. These are harvested and treated in a manner similar to that for eucalypts. Avoid stripping off the juvenile fruit which will furnish the next year's crop.

She-oaks. The seed is usually retained in the capsules for some years for species other than Bull-oak (*Allocasuarina luehmanni*). With Bull-oak it is necessary to collect the seed in the autumn, before seed is shed. With the other species it is usually possible to collect from the mature capsules over a number of years before they open and release all the seed. Be careful and collect only from the large mature capsules on the tree. Individual cones are hand-plucked from the branches. Do not mutilate the trees by cutting off branches.

Seed cleaning, treatment and storage

After harvest the capsules should be spread out on plastic sheeting on a shed floor or in a glass house to dry. This may take a week or more, depending on the temperature. The seed of species other than acacia can be dislodged from capsules by shaking. Do not leave the seed exposed to the sun for a long time on plastic sheet. The leaves and twigs should then be separated from the capsules. The capsules should be retained until no more seed can be shaken from them.

A set of small sieves varying from 1 mm to 5 mm in grid aperture are required to achieve easy separation of seed from capsules. Do not attempt to separate seed from the chaff. The seed should be stored in a large air-tight jar in a cool dry place (not in the glasshouse!).

She-oak, Hakea and Banksia may need direct sunlight through glass (or use of the warmer oven) to dry the capsules to a point where they will readily open and release the seed.

Acacia pods may require rough treatment in order to release the seeds. In some case it is sufficient to trample the pods in a woolpack. Small amounts can be rubbed through a garden sieve to dislodge the seed. In other cases, where large amounts of seed are involved, it may be necessary to use commercial-scale seed cleaning equipment. The dust from some acacia can produce a skin rash −this may occur with Blackwood.

Put naphthalene balls or similar crystals in an envelope and add that to the seed in the jar to kill or deter weevils. If that is not done any weevils in the seed will soon demolish the lot.

Stored seed of Bursaria will not be viable after 3 years. Seed of Callistemon, Eucalyptus, Leptospermum or Melaleuca will have limited viability after 3-5 years of storage at room temperature. However, the storage life may be extended if the seed is stored dry in the refrigerator. It is best to collect only what can be used in the short term.

Seed from Acacia and other hard-seeded shrubs (e.g. species in the family *Fabacea*, such as *Goodia medicaginea*) keep indefinitely without special storage, provided it is kept dry and free of weevils.