



Natural Resources and Environment

AGRICULTURE  
RESOURCES  
CONSERVATION  
LAND MANAGEMENT

# Landcare

# Notes



## How to collect seed from native trees and shrubs

May, 1999

TG0005

ISSN 1329-833X

David Perry, Melbourne

*Seed collecting can be easy and inexpensive although time-consuming. This note shows how to collect fruit from native plants, how to extract the seed, and lists some references for further information.*

Indigenous species (vegetation native to the local area) are the plants best suited to the local conditions and are in harmony with the landscape and wildlife.

Growing indigenous trees, shrubs and ground covers, either by regeneration, planting or direct seeding provides many benefits:

- shade and shelter for stock
- food and breeding sites for wildlife
- reduced soil salinity and erosion
- improvement of water supplies
- conservation of genetic resources
- enhanced landscapes, and
- timber and other benefits.

Most native trees and shrubs in Victoria are readily propagated or grown from seed. While seed of many species can be bought from commercial seed suppliers the origin of the seed and the likely tolerance of the plants to local conditions is often not known. If buying seed ask the supplier the locality (or provenance) of the seed source.

### How seeds develop

Seed collection from native trees and shrubs involves the collection of the fruit from the plant. The seed is often contained within the fruit (similar to the seeds inside an apple) and must be extracted. A fruit may be a nut, pod, cone, woody capsule or it may be fleshy.

Trees and shrubs, to reproduce, need the pollination of their flowers (e.g. eucalypts, wattles and sheoaks) or conelets (e.g. cypress-pines) by birds, mammals, wind or insects such as bees. Fertilisation may follow leading to the development, usually in unison, of the fruit and fertile seed (See Figure 1).

The interval between bud formation and maturity of the seed and fruit varies and may be as short as several weeks. For some plants such as eucalypts, which produce woody capsules, it may be up to one year or more after flowering before the fruit and seed inside are ripe and ready to collect. Some banksias and bottlebrushes can take several years.

With many species, the fruits are mature when they reach full size and turn dry and woody. Many fruits split on maturity, allowing the seed to be shed and to be dispersed by wind and other agents. Fleshy fruits like those of many rainforest species soften when they mature and sometimes also change colour, for example from green to red - this attracts fruit eating birds and mammals which act as agents for seed dispersal.

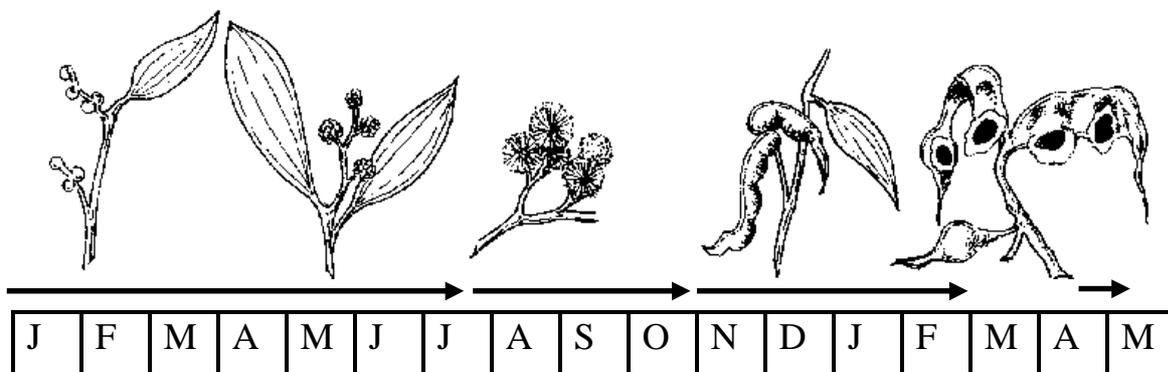


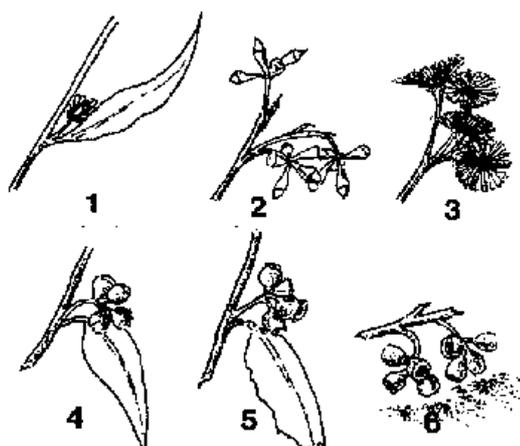
Figure 1. Development of Blackwood (*Acacia melanoxylon*) fruit from flower buds through flowering to ripe seed and pods.

Many plants, like the pod-bearing wattles, shed their seed within weeks or even days of maturity, while others, such

as some eucalypts and bottlebrushes, retain them for months or years, building up a large store of fruit and seed

on the tree. Many species of Australian flora are adapted to release their seed store immediately after burning by fire.

The number of flowers and fruits produced may vary greatly from year to year and from stand to stand and is both genetically and environmentally controlled. Some species show genetically determined cycles in the amount of seed they produce and have 'seed years' when bumper crops are available for collection. Local environmental factors such as rainfall, insects and fungi can modify this cycle.



*Figure 2. The development of fruit and seeds in a Eucalypt species showing the development of the buds (1&2), flowering (3), development of the fruits (4&5), and the mature fruit shedding seed (6).*

## Planning your collection

Anybody with some basic knowledge and equipment can collect tree or shrub seed but should first consider the following.

### How much do I collect ?

The amount of seed collected will depend largely on the species and the size of the seed. A kilogram of wattle seed can contain around 50,000 seeds whereas the much smaller eucalypt seed has up to 500,000 seeds a kilogram.

Melaleucas and Callistemon (bottlebrushes) species often have over 1,000,000. The amount you collect will depend on the purpose for which the seed is required. With direct seeding, germination rates are much lower than seed sown in a green house for tubestock. About 150-300 grams of seed is needed for each kilometre of direct seeding and about 15 grams of seed is needed to grow 1,000 seedlines (tubestock).

Five builder's barrows of eucalypt branchlets without much leaf will provide around one kilogram of seed and one to two barrows of casuarina cones will also produce a kilogram. About half an hour of constantly picking wattle pods should result in one quarter to one half of a kilogram. Experience is the best teacher, but collect only as much as you need.

### Locating suitable collecting sites

Ask local collectors, or refer to books which show species distribution. People who collect seed regularly are always on the lookout for trees and shrubs with potential for good seed crops, eg. a heavy flowering may indicate a high yield of seed. Local beekeepers often have an excellent knowledge of local flowering times.

When travelling around your property or area take notes on which trees and shrubs you think will provide a good quantity of seed. This will save time later when the seed is ready to be collected.

Fruit from tall tree species is often easiest to collect from roadsides or along creeks rather than from forests. In forests, the competition for light between trees means that many species' lower branches will be out of reach. Trees in more open areas tend to branch out lower to the ground and seed collection will be easier.

### Identifying species

Correct species identification is vital and several excellent field guides are available (see references). If you are in doubt, ask at your local NRE office, local nursery or forward a botanical specimen (leaves, fruits and flowers or buds pressed between sheets of newspaper or blotting paper) together with a description of the tree's location, size, general appearance and bark to the:

National Herbarium  
Birdwood Avenue  
South Yarra, Victoria 3141.

The Herbarium will not return your sample so ensure you have taken two.

### Obtaining permission

Laws protect a range of native flora in Victoria. Of all Victoria's vascular plants (seed producing plants and ferns), 26 % of species are classed as rare, endangered or vulnerable and 1 % of species are extinct. Seed collection permits are used by government agencies to avoid over collection of sensitive species. Plant seed is a resource that must be used sensibly.

At present under the Flora and Fauna Guarantee Act (1988) permission is required for collecting seed from public land (reserves, state forest etc.) See Landcare Note TG0008: *What permit do I need to collect local seed?*

### Deciding when to collect

To collect seed efficiently, a basic understanding of the plant's flowering cycle is required. Check the literature for guidance on flowering and seeding times and, if possible, visit trees and shrubs regularly to check on seed ripeness and availability.

**For most pod-bearing species such as wattles, the correct time for collection is crucial.**

Local nurseries, seed collectors and NRE staff will be able to advise you when fruit on a particular species is likely to be ripe. As a general rule for many eucalypts,

bottlebrushes and tea-trees, the previous year's seed is ready for collection when the trees are flowering this year.

Early spring to late summer can be especially busy for collectors. Allow for heat waves and bursts of hot windy weather that can accelerate ripening and seed drop in species like wattles and some eucalypts. In a good 'seed year' the seed quality is better and harvesting is easier.

In general, fruit of common native plants is brown when ripe. Check by scratching with a finger nail that the fruit is brown beneath the surface. Generally, if the fruit is brown on the outside and green underneath when scratched, the seed is not ripe. Some species however, such as Red Gum or Manna Gum have relatively green fruit when ripe.

Many eucalypt's seed is dark brown to black in appearance which contrasts with the lighter coloured chaff (infertile material). A pair of secateurs can be used to cut through eucalypt fruits (try a number of times). Ripe seed will clearly display the dark seed coat. If you have cut through the seed, it will show a firm white 'flesh' inside. Unripe seed does not show these colours and the seed and chaff cannot be distinguished. This technique can be especially useful with the box species which are often hard to assess for ripeness by fruit colour.

Avoid collecting in wet weather. More time will be required to dry the fruits and it will increase the chance of fungal problems.

### Selecting seed trees and shrubs

Just as human characteristics like hair colour can be inherited by offspring, some characteristics of a tree can also be passed on.

Trees (and shrubs) can be selected for their tolerance to insect attack, their straight trunk or proximity of branches to ground level. Collect seed from plants growing in similar site conditions ie. the same soil types and conditions, aspects and climatic factors, to where you wish to plant or direct seed.

Selection of seed trees in natural bush, however, is not always reliable - some trees, although genetically sound, may be of poor appearance due to factors such as fire and flood damage or competition between plants for water and nutrients.

Follow these guidelines:

- Collect seed from both good and poor specimens from different parts of each tree or shrub to maintain genetic diversity and minimise subsequent inbreeding.
- If possible, don't collect from isolated trees and shrubs of the same species as self-pollination often yields seed of low viability and the seedlings produced are generally poor specimens of low vigour. Species with both male and female plants such as some casuarinas will need at least one plant of each sex in each stand of trees to produce viable fruit.
- The large size and fullness of fruit, a shiny seed coat and firm white flesh inside the seed are indicators of the viability of fruits. Some species produce fruits that appear to be suitable but lack any viable seed. For

example, *Dodonaea viscosa* (Giant Hop-bush) under drought conditions will produce full size fruit which is either empty or contains unviable seed. Similarly *Banksia marginata* (Silver Banksia) can produce cones without seed and *Acacia dealbata* (Silver Wattle) often produces seedless pods.

- To encourage genetic diversity, collect seed from as many plants as possible within each stand (*ie. at least 12*). A particular tree or shrub may well have a special feature in its genes which may be important for the continued existence and evolution of the species in the long term.
- Always keep in mind the purpose of collecting the seed. Generally, for best results, seed collected from a particular aspect or soil type should be planted in a similar situation.
- For most purposes, seed obtained from different plants of the same species from the same geographic region can be mixed. However, if you are uncertain about species identification or seed quality, keep the seed from individual plants separate until identity and viability are checked.
- Always check that the fruit hasn't already opened and released the seed.

### Do you have the right equipment?

Have the right equipment for the job and make sure it is in good condition. For small collections you may simply need a few paper or cloth bags or old envelopes and some secateurs but planning is required for large collections at remote sites. Protective gloves can be handy for spiny plants. Fruits from most species can be collected easily without expensive equipment.

### Playing it safe

Safety precautions will vary with local conditions, tree species and collection methods used. Some safety hints, particularly in isolated areas are:

- work as a team
- wear appropriate clothes, safety hat and footwear, and
- take a first aid kit.

Seed can often be collected safely from the ground or by using a step ladder, but if you plan to climb tall trees, take extra care.

### Common types of fruit

There are three common types of fruit:

- Capsules are often dry and woody and usually retained on the plant for several years. They open with several splits and the small seed is usually produced in large quantities. Seed capsules are found on the following genera: *Eucalyptus* (eucalypt), *Leptospermum* (tea-tree), *Callistemon* (bottlebrush) and *Melaleuca* (paperbark and honey-myrtle), as well as *Casuarina* and *Allocasuarina* (both sheokes).

- Follicles are similar to capsules, but differ in that they have a major split along one edge of the fruit only. The fruit is often dry and woody and the seed can have light papery wings to aid dispersal. These include *Hakea*, *Grevillea* and *Banksia*.
- Pods split along two edges when dry and the seed usually has a hard coating when ripe, allowing it to remain viable for many years. Pods are found on plants in the following genera: *Acacia*, *Cassia*, *Hardenbergia*, *Daviesia*, *Indigofera* and *Kennedia*.

The techniques of seed collection and extraction will vary for each type of fruit and further information can be obtained from NRE staff, local nurseries and seed collectors.



*Figure 3.*  
 1 *Eucalyptus* capsules and seed  
 2. *Banksia* follicles and seed  
 3. *Acacia* pods and seed

## Seed collecting methods

### Responsibility

Anyone who undertakes seed collection has a responsibility not only to the local environment but also to the rest of society and future generations.

That responsibility is to collect seed without damaging the local environment and still leave sufficient seed on the tree for both other collectors, insects, animals and the tree itself.

Many insects and marsupials rely on the seed crops of native trees and shrubs for food. Seedlings of new plants will only establish and grow to replace older ones if there is suitable and sufficient seed on the parent plant. Often damage can be done to small but important understorey species by a vehicle or foot traffic. Be aware of your environment, look down and do not over collect. Collect only the fruit and wherever possible don't damage the future years crops i.e. flowers and buds - you may want to collect from that particular tree next year.

A good rule is to collect no more than 10% of the seed present from any given plant. This should ensure that

sufficient seed is left behind to serve nature's purposes as well as other seed collectors in your area.

Pod-bearing species such as wattle, bitter-pea and kennedia are easy to collect because you simply "pick the pods" like peas in the vegetable garden. Collecting the pods avoids any damage to the plant itself. Many species of eucalypt, bottlebrush and tea-tree, for example, will have ripe fruits, immature fruits, buds and flowers on the one branch. In these cases, it is required only to remove the mature fruit. These will be closest to the trunk. Cutting of complete branchlets will remove the plant's seed producing potential for many years.

### Natural seed fall

Large seed or fruit which falls to the ground when mature can be collected using sheeting laid beneath the tree or shrub. This technique is useful with some species but is unsuitable for eucalypt and melaleuca species which have fine seed dispersed by wind. Often after heavy winds or storms branches are blown from trees and seed can be collected from them. While not a reliable source of seed it is worthwhile when the opportunity arises.

### From low branches

Fruit on low branches can be hand picked, without damaging the plant, into a wide mouthed bin or container or stripped onto sheeting laid beneath the tree. Planting apron bags, fruit picking bags, boxes, or calico bags hung around the neck of a collector by a strap or belt will leave both hands free and enable quicker collection.

Alternatively a tarpaulin can be spread beneath the tree or shrub. These techniques are particularly appropriate for *Acacia* (wattle), *Melaleuca* (tea-tree) and *Callistemon* (bottlebrush) species.

Beating branches (without damaging the tree) can be effective for collecting fruit from casuarinas. Climb the tree (to avoid being hit on the head) and gently beat the branches with a stout stick or rod.

### From higher branches

If branches are out of reach, a variety of long-handled tools can be used (see Figure 4). These include 'parrot beak pruners' and saws. A plank mounted on the tray of a ute is handy because fruit of the same species can be dropped into the tray and then swept out into a bin later.

Often collecting seed from tall tree species can be a problem. Wherever possible, attempt to coordinate seed collection with annual pruning work undertaken by agencies such as the electricity authorities or the local shire. A number of Landcare groups in Victoria work with them to collect the seed from prunings. This is often the simplest way to collect bulk seed required for direct seeding works. In good seed years the cost of hiring a cherry-picker for collection could be shared between a few people.

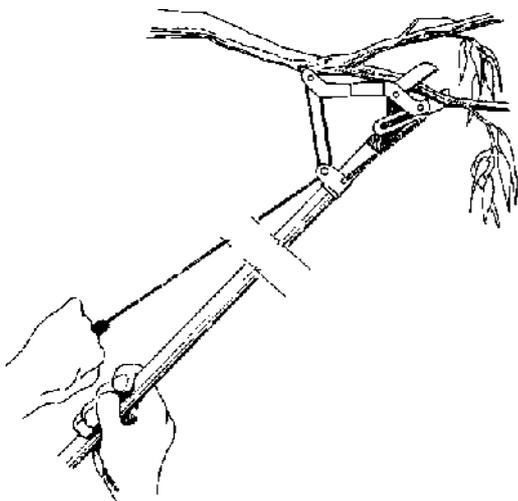
### Climbing

Climbing taller trees may be possible but agility and special attention to safety are required. Common aids

include climbing irons, safety belt, and portable or mounted ladders. In all cases care should be taken to avoid damaging the tree.

### **Felled trees**

Trees should not be felled simply for harvesting of seed. However, if a tree is being cut down for other reasons, any seed present can be salvaged from it. In some districts, the easiest and cheapest way to collect large quantities of seed is to visit a local clearing or timber harvesting operation. Obtain permission beforehand and of course avoid danger. The quantity of seed can be worth the effort. Often trees are cut down for coppicing (reshooting from the stump). The coppicing of sugar gums (a non-local species) on the Western Plains is common and could be an excellent source of seed.



*Figure 4. Long handled cutting tool*

### **Transportation**

A day's seed collection should result mostly in fruit and some small twigs and leaves being picked. This reduces the amount of material to be transported, although some collectors prefer not to remove the leaves from branchlets because the capsules dry out much quicker. This can be important if collecting in winter and drying fruit without heating or if space for drying is limited. In very hot weather, collect the fruit straight into bags as the capsules of some species will open within hours if some leaves remain attached.

Large amounts should be bagged for transport - CSIRO uses calico collecting sheets (2 x 2 metres) with corners tied diagonally, or close-weave calico bags for small seed and hessian bags for large seed. Wool bales are suitable for large quantities of fruit of many species.

### **Accurate labelling of bags and bundles is essential.**

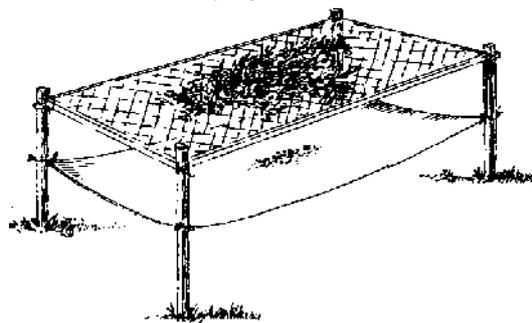
Plastic bags are not recommended for collecting fruit as it will usually enable sweating. In a few hours, the seed or fruit can go mouldy, lowering seed viability. Don't collect wet fruits if at all possible for the same reason. Avoid prolonged transport periods for green fruits, especially in

hot weather, as the high moisture content encourages micro-organisms, fermentation and overheating which can also reduce the seed viability (capacity to germinate).

## **Drying and extracting the seed**

### **Drying the seed**

Usually mature fruit are dried to release seed. The fruit can be spread thinly on sheets of black plastic, corrugated iron, tarpaulin or similar material and exposed to the sun, or placed in a **well-ventilated area**, for example, the floor of a shearing shed, glasshouse or drying room. Small quantities can be dried in a paper or hessian bag containing a mothball to kill seed eating insects. Do not use a microwave oven for drying seed -it cooks them!



*Figure 5. Drying the seed*

Turn and shake the fruits regularly and protect from any ants, rats, mice and domestic or wild animals. Do not leave the tarp on the shed floor because rats and mice may consume large quantities of seed.

In warm, sunny weather, drying is completed in a few days. In colder weather, improve ventilation by using a wire-netting hammock under cover. Place the fruits on the wire and hang a tarpaulin below the hammock to catch the released seed (See Figure 5).

### **Extracting the seed**

The seed at the bottom of a capsule is often the most fertile and most developed. With some species - for example eucalypt, melaleuca and casuarina - vigorously shaking and tapping the dried fruit against the side of the container will release the seed. Continue to regularly shake the drying capsules to ensure all seed is removed.

A plastic ice-cream container or bucket with a lid can be used. If you have collected branchlets these can be thrashed on a tarp or sheet to extract the seed.

Remove the fruit only after you are sure all the seed has been extracted. Extraction is more difficult with species where the fruit does not open easily, the seed remains firmly attached to the open fruits, or the fruits are covered with fleshy outer covering. The leftover fruit may be useful for mulch or you can even scatter some around your planting site to see what germinates!

Where the fruit retains seed, it may be beaten to dislodge the seed, or tumbled (perhaps in a concrete mixer with stones or blocks of wood or using a broom), or thrashed by machine. Take care, however, not to damage the seed.

A modified garden mulcher can be worthwhile if dealing with large quantities of particular fruit eg. *Acacia*, *Daviesia*, *Indigofera* etc. The mulcher is modified by replacing the steel cutting blades with conveyor belt rubber (so as not to cut or damage seed). The narrow slot opening is replaced with a larger chute that allows faster feeding of pods.

Seed is often difficult to extract from banksia cones.

This can be over come by burning the cones with a hand-held gas burner.

### **Cleaning the seed**

Prior to sowing or storage, seed usually requires a final cleaning to remove unwanted parts of fruit and other impurities. However, complete cleaning is not always possible or necessary - for example fertile eucalypt seed is often mixed with chaff. In many eucalypts, 80 to 90 % of the material in the capsules is chaff. Generally, the larger darker pieces are the viable seed.

Seed can be cleaned during drying by using a wooden box with a mesh base placed over a collection tray. As the fruits dry the seed falls through the mesh and is collected below. All that is needed is to turn the fruit from time to time.

The seed of many species can be cleaned by sieving through a wire mesh - the mesh size is selected to suit the size of the seed being handled. A professional seed sieve is not essential and a kitchen colander or domestic sieve will do for smaller quantities. Place a lid over the sieve and shake vigorously to extract the last of the seed from the capsules. Where large quantities are collected it may be worthwhile investing in a seed sieve eg. a size number 8 and for smaller seed use flywire placed in the sieve. The cost of a seed sieve will vary depending on size, but around \$20 is a reasonable price.

Winnowing or use of an air stream (eg. dropping the seed and unwanted material mixture in front of a domestic fan - the lighter waste material is blown away) to separate impurities from the seed is effective for some species and may be combined with sieving.

**Seed should be stored as soon as possible after extraction.**

### **Storing the seed**

Before storing, check that the surface of the seed is dry and each seed lot is free from insects. A range of small seed eating insects may be present with the seed. A light dusting with a low toxicity insecticide is often necessary and recommended if seed is to be stored for any length of time. Paradichlorobenzine is also effective and is readily available as urinal disinfectant blocks. Place the seed in an airtight jar with a couple of disinfectant blocks wrapped in an open weave cloth. Remove them after two weeks.

Mothballs can be kept with the seed as a guard against insects but do not use this method for long-term storage. It may affect the viability of the seed.

Store the seed in airtight nearly-full containers. Glass, plastic or metal containers with tight -fitting lids are suitable, as are plastic bags which can be sealed. Ensure that the seed is dry before storage so that mould is not a problem.

For storing seed of many native species - for example, eucalypt, wattle, melaleuca and casuarina - keep humidity and temperature levels low and fluctuations to a minimum. By placing containers in a cool location away from direct sunlight and safe from vermin, seed of many species can be stored for several years or longer at room temperatures of approximately 10-25°C and relative humidity of between 40 and 60 per cent. Even in ideal conditions seed will lose viability over time. Storage is more often a problem in warm rainy climates than in drier climates.

Avoid storing seed in a tin shed due to the wide variations in temperature. Generally for storage of native seed the following guide is best for all species:

- 3 to 6 months - a paper bag in a cool dry place
- 6 to 12 months - an airtight jar in a cool dry dark place
- more than 12 months - keep refrigerated as well (above 0°C and preferably around 4°C); wattle seed does not need to be refrigerated because they have a hard seed coat.

Some seed cannot be stored successfully. For example, the seed of many fleshy-fruited species must be sown as soon as it is collected.

### **Seed records**

It pays to keep careful records of each seed-lot. During collection, jot down in a field note book the site location and comments such as soil characteristics, associated species and whether the trees and shrubs seem adapted to such features as drought, saline soil or seasonal flooding. This information may be very useful later when selecting species and provenances to grow on a particular site and when interpreting planting results. Correct labelling is often overlooked but is essential.

Note the main characteristics of each tree sampled and the number of plants making up the seedlot. Remarks on the timing of the collection and the method used may be useful. In special circumstances, for example if seed are to be sold or displayed, a colour photograph of the parent plant is helpful. Photocopies of plant fruits, leaves and flowers can also provide a permanent record of the species.

When dealing with species of uncertain identity, collect herbarium specimens. Keep one as your record and send a duplicate to a herbarium for identification.

Careful labelling is essential from collection, to storage through to use. In a seed store, a seed record card system is a useful method of stock control. On one side of the card summarise the collection data and on the other write details about the distribution of any part of the lot, together with a running total of the amount of seed remaining in stock.

### Seed Banks

Several seed banks have been established in Victoria where seed can be stored or traded for other seed. Seed banks are often operated by community groups and may not be a commercial operation. Locations and contacts for them may be obtained by speaking to local staff of the Department of Natural Resources and Environment. Alternatively it may be worthwhile to develop your own seed bank. This will ensure you have sufficient seed each year when a particular species is difficult to obtain.

### References

#### Identification

- Costermans, L. (1992). *Native trees and shrubs of south-eastern Australia*, Weldon, Sydney. (A pocket-sized field guide version called 'Trees of Victoria' is available for around \$5.00)
- Elliot, G. (1990). *Australian plants identified*. Hyland, Melbourne.
- Midgley, S.J, and others (eds) (1983). *Casuarina ecology, management and utilisation*. CSIRO, Melbourne.
- Wrigley, J.W, and Fagg, M. (1979). *Australian native plants*. Collins, Sydney.
- Cunningham, G.M, et al (1981). *Plants of Western New South Wales*. N.S.W. Government Printing Office, Sydney.

#### Seed information

- Boland, D.J, and others (1984). *Forest trees of Australia*. Nelson CSIRO, Melbourne.
- Boland, D.J, and others (1980). *Eucalyptus seed*. CSIRO, Melbourne.
- Buchanan, R.A., (1989). *Bush regeneration*. Tate, Sydney.
- Elliot, W.R, and Jones, D.L. (1989). *Encyclopedia of Australian Plants* Vol. 1. Lothian, Melbourne.
- FAO (1985). *A guide to forest seed handling*. FAO Technical paper 20/2 available from Distribution and Sales Section, FAO, Via delle Terme di Caracalla , 00100 Rome, Italy.
- Langkamp, P. (Ed) (1987). *Germination of Australian native plant seed*. Inkata Press, Melbourne.

### Acknowledgements

This note is based on the leaflet 'How to collect Native Tree Seed easily' produced by Greening Australia. Special thanks to Jim Robinson of Greening Australia (Victoria) for his assistance in compiling this note.

**This publication may be of assistance to you but the State of Victoria and its officers do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.**