

## **How to Collectt Native Tree Seed Easily**

This pamphlet was prepared by Greening Australia in November 1991.

Text - John Doran, Officer in Charge, Tree Seed Centre, Division of Forest Research, CSIRO, and others. Printing Paragon Printers, Fyshwick, ACT. Front cover photograph Jeff Schultz, Queanbeyan, NSW.

### **Contents**

Seed development  
Planning your collection  
Selecting seed trees  
Seed collecting methods  
Transportation  
Drying and seed extraction  
Cleaning  
Storage  
Seed records  
Useful references

There are many reasons why Australians should plant more trees. The right trees in the right places can provide shade and shelter for stock and wildlife, reduce soil salinity and erosion, improve water supplies, enhance landscapes, and provide timber and other benefits.

There are distinct advantages in basing such plantings on species native to the planting area, since these are usually well-suited to local conditions and in harmony with the landscape and wildlife. Such plantings also help conserve genetic resources for future generations.

Trees are generally propagated from seeds and their growth is greatly influenced by the choice of high quality seeds. Seeds or seedlings of many native tree species can be bought but may be costly or even ill adapted for local conditions- in these cases it is best to collect your own seeds. Collecting can be easy, inexpensive and is especially rewarding when you see your trees prospering and growing.

This leaflet shows how to plan and undertake seed collection, and lists some literature giving further information.

### **Seed development**

Described simply, trees reproduce either by flowers, for example eucalyptus and wattles, or by cones, for example cypresses and pines. Many types of flowers and cones are found, and a particular type may characterise a species, a genus or even an entire plant family.

Shown here is the reproductive sequence of the snow gum (*Eucalyptus pauciflora*), illustrating how eucalyptus produce and scatter seeds.

(a) Very young cluster of flower buds (b) Cluster of developing flower buds (c) Flowers, creamy white (d) Fruits, commonly called gumnuts, containing ripe seeds (e) Dry fruit scattering seeds; empty fruits often remain on the tree for some time.

Source: Boland, D.J. and others (1980). *Eucalyptus seed*. CSIRO, Melbourne.

After pollination of the flowers or conelets by birds, insects, mammals, wind or other agents- and fertilization of the ovules they contain- development of the fruits and fertile seeds usually proceeds in unison. The interval between bud formation and maturity of seeds and fruits varies greatly with species-from a few months to as long as several years.

With many species, the fruits are mature when they reach full size and turn dry and woody. Capsules, pods and cones usually split on maturity, allowing seeds 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 thus act as agents for seed dispersal.

Many trees, like the wattles, shed their seeds within weeks of maturity, while others, like some eucalyptus, retain them for months or years, building up a large store of seeds. The number of flowers and fruits produced may vary greatly from year to year and from stand to stand of trees, and is both genetically and environmentally controlled. Some species show genetically-determined cycles in the number of seeds 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.

### **Planning your collection**

Any robust person with some basic knowledge and equipment can collect tree seeds but should first consider the following.

*Obtain permission* - Laws protected range of native flora. Permits are required for collecting on public land and for some species on private land also. Initial enquiries can be directed to the State national parks service, or the forest service or State herbarium.

*Identify species* - Correct species identification is vital and several excellent field guides are available (see references). If you are doubtful, 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 your nearest State herbarium for checking.

*Locate suitable collecting sites* - Seek advice from local forestry staff, State herbaria or others with local knowledge, or refer to books which show species distribution.

*Decide when to collect* - Check the literature for guidance on flowering and seeding times and, if possible, visit trees regularly to check on seed ripeness and availability. From early spring to late summer can be especially busy for collectors. Allow for the fact that heat waves and bursts of hot windy weather can accelerate ripening and seed drop in species like wattles. In a 'seed year' the seed quality is better and harvesting is easier.

Assemble the right equipment - for the job and make sure it is in top condition. For small collections you may simply need a few paper bags and some secateurs but detailed planning is required for large collections at remote sites.

Forestry workers collecting wandoo (*Eucalyptus wandoo*) seeds near Mundaring, WA. Following commercial sleeper-cutters, they are picking gum nuts containing seeds and placing them on a tarpaulin in a utility.

*Play it safe* Safety precautions will vary with local conditions, tree species and collection methods used. Some safety hints are: work as a team; wear appropriate clothes, safety hat and footwear; and take a first aid kit. Seeds can often be collected safely from the ground or by using a step ladder, but if you plan to climb high trees, take extra care.

### **Selecting seed trees**

After selecting a suitable tree species, choose to collect seeds from the best individual trees. Just as some human characteristics like hair colour can be inherited by offspring, some characteristics of a tree can also be passed on. Highly inheritable characteristics of a tree include stem form, branching and, to a lesser degree, growth rate. However, selection of seed trees in natural stands is not always reliable-some trees, although genetically sound, may be of poor

appearance due to factors such as fire or flood damage and competition between plants for water and nutrients.

Geographic origin (provenance) of the seeds can greatly influence certain features of cultivated plants. For example, snow gums (*Eucalyptus pauciflora*) growing naturally at very high altitudes are small (less than 3 metres) and often have several trunks-their offspring are similar even when grown in gardens in warmer areas. Snow gums growing naturally at lower and warmer areas are taller (usually 10-20 metres) with single trunks. Not all species show such marked variation due to seed source, but when planting or sowing species which do, choose a provenance which suits the site and your needs.

Follow these useful guidelines:

- Collect seeds only from healthy, vigorous trees of desirable form;
- If possible, don't collect from isolated trees of the species as self-pollination often yields low quality seeds.
- To encourage genetic diversity, collect similar quantities of seeds from several well-spaced trees say 100 metres apart. This encourages genetic diversity and the more specimens sampled the better. This spacing may be reduced where tree numbers are small.
- For most purposes, seeds obtained from different trees of the same species from the same geographic region can be mixed. However, if you are uncertain about tree identity or seed quality, keep the seeds from individual trees separate until identity and viability are checked.

### **Seed collecting methods**

#### *Natural seed fall*

Large seeds or fruits which fall to the ground when mature can be collected on the forest floor from sheeting laid beneath the trees. This technique is useful with certain rainforest species but is unsuitable for trees like eucalypts and melaleucas which have fine seeds dispersed by wind.

#### *From low branches*

Fruits on low branches can be hand picked into a container or stripped onto sheeting laid beneath the tree. With acacias, when the pods are brown and split along the margins, beat the branches with a stick to dislodge seeds and pods onto sheeting.

Wattle twigs with pods attached being collected on a calico sheet. They will be bundled for transport by tying opposite corners of the sheet.

### *From higher branches*

If branches are out of reach, a variety of longhandled tools (saws and pruners) can be used. Other methods include use of a rope saw or a rifle with a telescopic sight if you have a permit.

A bow and arrow, or a shanghai with some fishing line and sinker, and some 5 mm sash cord or nylon rope can also be used. Fasten the line to the arrow or sinker, and shoot the line across the end of a branch. Then haul the cord or rope over and use it to break off the end part of the branch.

Long-handled tool for seed collecting made by fastening a curved pruning-saw blade to a wooden or aluminium pole. Secateurs and a rake can also be handy when collecting.

### *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.

### *Felled trees*

Trees should not be felled simply for harvesting seeds. However, if a tree is being cut down for other reasons, any seeds present can be salvaged from it. In some districts, the easiest and cheapest way to collect large quantities of seed is to visit local clearing or timber harvesting operations. Obtain permission beforehand, select good parent trees and of course avoid danger. The quantity of seeds can be worth the effort.

## **Transportation**

Collection activities may yield pure seeds, fruits only, or leaves and branches with fruits attached. The latter may need some further breaking down by cutting, beating or trampling to reduce bulk for transport. A large crop 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 seeds, or hessian sacks for large seeds. Careful labelling of bags and bundles is essential.

Avoid prolonged transport periods for green fruits, especially in hot weather, as the high moisture content encourages micro-organisms, fermentation and overheating which can reduce the seeds' capacity to germinate.

## **Drying and seed extraction**

### *Drying*

Usually the mature fruits must be dried to release the seeds. The fruits are spread thinly on sheets of black plastic, tarpaulin or similar material and exposed to the sun, or placed in a well-ventilated shed, glasshouse or drying room. Turn the fruits regularly and protect from any ants, rats, mice and domestic or wild animals. With fleshy fruits, the outer pulp should be removed prior to drying.

In warm sunny weather, drying is complete in a few days. In cooler 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 seeds.

Drying is commonly used with many species but is not appropriate for some delicate seed types, such as some rainforest species.

These wattle pods, sun dried on a tarpaulin, have opened. Seeds may be picked from small batches by hand but with larger batches, seeds may be freed from pods by threshing, then pod fragments removed by sieving and air blowing.

### **Seed extraction**

The seeds at the bottom of a capsule are often the most fertile and best developed. With some species—for example eucalypts, melaleucas and casuarinas—vigorously shaking the dried fruits will release all seeds, while tapping the fruits against the side of the container can also assist. Extraction is more difficult with species where the fruits do not open naturally, or the seeds remain firmly attached to the open fruits, or the fruits are covered with fleshy outer covering.

Where the fruit retains the seeds, it may be beaten with a green stick to dislodge the seeds, or tumbled (perhaps in a concrete mixer with stones or blocks of wood), or threshed by machine. Take care not to damage the seeds.

With fleshy fruits, the fleshy covering usually is best removed, as it may inhibit germination and affect drying and storage. Seeds may be removed and cleaned by hand with a knife, brush and water, or the fruits may be pulped in water and the seeds strained off and dried.

Colourful fruits of a rainforest species; yellow kamala (*Mallotus discolor*). Seeds of many fleshy-fruited rainforest species will not tolerate drying and storage, and should be sown fresh immediately after collection.

### **Cleaning**

Prior to sowing or storage, seeds usually require a final cleaning to remove unwanted parts of fruits and other impurities. However, complete cleaning is not always possible or necessary—for example fertile eucalypt seeds are often mixed with and indistinguishable from infertile ovules known as chaff.

The seeds of many species can be cleaned by sieving through a wire mesh—the mesh size is selected to suit the size of the seeds being handled. Winnowing or use of an air stream to separate impurities from the seeds is often effective and may be combined with sieving.

Sieving dried and threshed wattle pods and seeds with a coarse mesh sieve to remove large pieces of pods. Small pod fragments will be removed by a fine sieve then air blowing.

### **Storage**

Before storing, check that the surfaces of the seeds are dry and each seedlot free from insects. A light dusting with a low toxicity insecticide may be necessary and is recommended if seeds are to be stored for a year or more.

For storing seeds of many native trees—for example, eucalypts, wattles, melaleucas and casuarinas—keep humidity and temperature levels low and fluctuations to a minimum. The easiest way to do this is first to seal the seeds in air-tight nearly-full containers. Glass, plastic or metal containers with tight-fitting lids are suitable, as are plastic bags which can be sealed.

Store the containers in a cool location away from direct sunlight and safe from vermin. Seeds of many species can be stored safely for several years or longer in sealed containers at room temperatures of approximately 10-25°C and relative humidity of between 40 and 60 per cent. Storage is more often a problem in warm rainy climates than in drier climates.

Some seeds cannot be stored successfully. For example, the seeds of many fleshy-fruited species must be sown as soon as they are collected.

### **Seed records**

It pays to keep careful records of each seedlot. During collection, jot down in a field note book the site location and comments such as soil characteristics, associated species and whether the trees 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. Note the main characteristics of each tree

sampled and the number of trees making up the seedlot. Remarks on the timing of the collection and the method used may be useful. In special circumstances, for example if seeds are to be sold or displayed, a colour photograph of the parent tree is helpful.

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.

These eucalypt seedlings are the one species but two different provenances of that species. Seedlings were grown under similar conditions and one provenance (on the left) grew faster. Conservation of local trees can help preserve such variation within a species.

#### Useful references

- Boland, D.J. and others ( 1984). Forest trees of Australia. Nelson-CSIRO, Melbourne.
- Boland, D.J. and others ( 1980). Eucalyptus seed CSIRO, Melbourne.
- Brooker, M.I.H. and Kleinig, D.A. (1983). Field guide to the eucalypts. Inkata Press, Melbourne and Sydney.
- Costermans, L. (1983). Native trees and shrubs of southeastern Australia. Rigby, Australia.
- Department of Arts Heritage and Environment and Institute of Foresters of Australia ( 1985). Think trees grow trees. AGPS, Canberra.
- Doran, J.C. and others ( 1983). Handbook on seeds of dny-zone acacias. FAO, Rome.
- Francis, W.D. ( 1981). Australian rainforest trees. ACPS, Canberra
- Midgley, S.J. and others (eds) (1983). Casuarina ecology, management and utilization. CSIRO, Melbourne.
- Nicholson, N. and H. (1985). Australian rainforest plants. Terania Rainforest Nursery, via Lismore, NSW.
- Willan, R.L. ( 1985). A guide to forest seed handling. FAO Forestry Paper, 20/2.
- Wrigley, J.W. and Fagg, M. (1979). Australian native plants. Collins, Sydney.
- Yeatman, C.W. and Nieman, T.C. ( 1984). Safe tree climbing in forest management. Canadian Forestry Service, Forestry Technical Report 24.