NATIVE PLANT PROPAGATION FOR BUSHLAND REHABILITATION

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Compiled and adapted by Michael Boland and Richard Rawlings for the Land for Wildlife program south-east Queensland

Benefits of growing local native plants?

Almost every bushland rehabilitation project involves the planting of native species. 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. Propagation material sourced from near to the planting area is referred to as 'local provenance'.

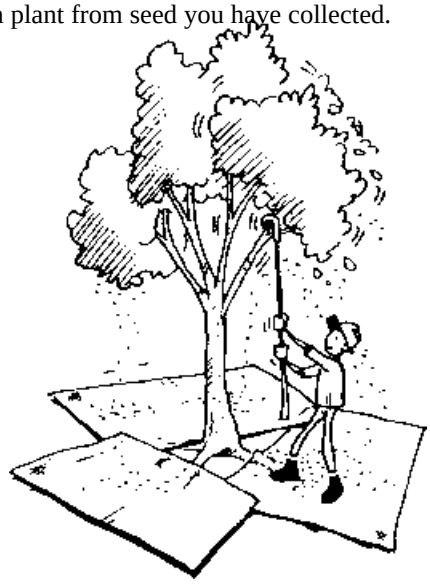
In addition, the use of local provenance also serves to:

- conserve the local flora and therefore the local fauna;
- maintain genetic diversity;
- contribute to the aesthetics and preservation of local character;
- lower maintenance costs due to better survival rates, lower water and fertiliser requirements; and
- promote scientific research.

Furthermore, the benefit of becoming involved in the propagation process using locally collected seed is that you will develop a much greater knowledge and understanding of the individual species and the vegetation communities on your property.

Where can I source local native seed?

The most enjoyable and inexpensive way to collect seed is to do it yourself. Imagine the satisfaction of growing your very own plant from seed you have collected.



Shaking tree to release ripe seed onto collecting sheets

Community seed banks can also be a source of local seed and propagation information. Your local Society for Growing Australian Plants (SGAP) group will also be able to help.

Be mindful that interference with native flora is restricted by law and seeds should either be collected from private land with the owners' consent or from public land with a permit from the property owner (eg. Queensland Parks and Wildlife Service). Some species are subject to the Nature Conservation Act 1992, a permit may be required to collect and/or propagate.

When is the best time to sow?

Some seeds last for many years while others need to be sown immediately, or stored under special conditions. A general rule for native species is to germinate the seed about 3 to 4 months ahead of the intended planting-out-date and when daily temperatures are sufficiently warm. Most species will germinate best when daily temperatures rise above 20 degrees Celsius. Some species may require temperatures above or below this range.

Is hygiene important when growing plants?

Like people, diseases can attack plants. Plant diseases are present in soil or air borne, attached to trowels, the bench top, gardening gloves and reused germination trays and pots. To stop the spread of disease, ensure;

1. All soil is washed from equipment before preparing a sowing mixture, sowing a batch of seed or potting-up. Remember to wash your equipment and hands between jobs.
2. Propagating containers should be raised off the ground to allow proper drainage and avoid contamination from soil splashing or blowing into the containers.
3. Propagation and potting mixes should be stored so that there is no contact with water or other soil and should be covered to minimise contamination from air borne pathogens and weed seed.

If disease is common in your area or you plan to propagate a large number of plants, then the use of a disinfectant is recommended. Disinfectant may be purchased from your local chemist or you can make your own by adding 20 ml of laundry bleach per 1 litre of water. After washing your hands with water, dip them in disinfectant. Tools should be washed and then soaked in disinfectant for 5-10 minutes. Don't forget to disinfect bench tops as well.

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Do I need to treat the seed before sowing?

Seeds from many of our native species sprout readily when provided with a warm, moist environment. On the other hand, some species have developed ways of remaining dormant until the onset of favourable conditions. Seeds from these species need special treatment to overcome dormancy, before sowing.

Common pre-germination treatments of seed include:

1. **Nil treatment** – seed can be sown directly, eg. *Eucalyptus* species.
2. **Cold water soak** – pour cold water over seeds in a container and soak for 24 hours (eg. *Backhousia* species*)* or 48 hours (eg. *Syzygium* species).
3. **Hot water soak** – pour just boiled water over seeds in a container and soak for 24 hours (eg. *Brachychiton* species) or 48 hours (eg. *Cassia* species).
4. **Scarification** – some hard-coated seeds may need to have their coats pricked, rubbed with sandpaper, chipped, nicked or filed. Take care not to damage the internal contents of the seed. Do not damage the end of the seed where it was attached to the pod as this is where the seedling root emerges.
5. **Fermentation** – This is used to remove flesh from a seed eg. cycads and palms and fleshy fruits to break down inhibitors eg. found in some rainforest species. If the flesh is difficult to remove place it with some water in a plastic bag in the sun. Fermentation will occur and in 2-3 weeks the fruit is easily removed. This method can also be followed by leaching to remove chemical inhibitors.
6. **Leaching** – This removes chemical inhibitors by prolonged immersion in running water. The seed is placed in a mesh bag or nylon stocking and placed in the cistern of a frequently used toilet from 2 to 10 weeks. The seed is dried before planting. This is a useful treatment for palms, *Cordyline, Davidsonia, Endriandra and Pittosporum*. It has also been used with members of the Rutaceae family such as *Boronia, Eriostemon and Crowea* after first nicking the seed.
7. **Scorching and Smoking** – These are used to imitate the effects of a bush fire ie. heat and smoke. More recent research has shown that smoke is the more important factor. Scorching is achieved by sowing the seed in a heat proof container and lighting a fire on top using native twigs, leaves and shredded paper keeping it alight for 5 minutes. Allow to cool and water thoroughly. This method is useful for many members of the Rutaceae family including *Boronia*, *Eriostemon* and *Actinotus.* Smoking is carried out for about 1 hour. Prolonged exposure may retard germination. Smoke is produced in an enclosed space eg. a drum and piped into an enclosed space over the seeds. The latter species can be sown in trays or left exposed. The smoke should be warm or cool as excess heat may damage the seed. Water the seeds lightly to avoid washing off the smoke chemicals. Smoke, or smoked water, has been successful with species in the genera *Conospermum, Epacris, Eriostemon, Zieria, Crowea, Correa, Phebalium, Pimelea* and *Actinotus.*

What type of mixture is suitable for sowing seeds?

The easiest way to obtain a suitable propagation mixture is to purchase a commercial seed-raising mix from your local nursery stockist.

Alternatively you may want to make your own seed-raising mix. A range of materials may be used but the mix should have excellent drainage and good aeration. Materials used should be clean and free of weed seeds. Suggested mixes:

- 1:1:1 ratio of peat, sand and perlite
- 1:1 ratio of peat and sand

Mixes may be formulated to meet the specific needs of the plant species being propagated. i.e. medium to course sand for fine to large seeds, more peat for rainforest species and more sand for open forest species.

How do I sow seeds?

Seeds may be sown in **pots** or **trays**.

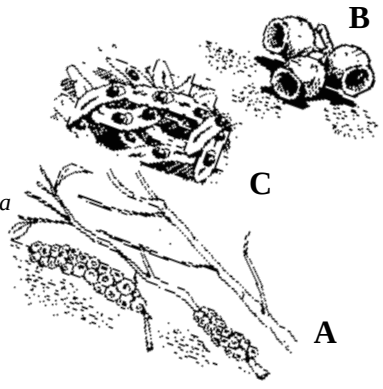
Containers to hold the propagation mix for seed raising can be obtained from a variety of sources, recycled or new, but should meet the following requirements:

1. Be well drained.
2. Minimise the use of propagation mix.
3. Convenient shape and size for the 'nursery' space.
4. Adequate depth to prevent 'J' root.

Sowing of seed directly into **pots** is suitable for large seed (eg. Black Bean), and those that develop deep roots before the seedlings emerge (eg. Palms) (Ralph, 1997, p.29). Sowing seeds in **trays** is a more common method and is particularly suitable for sowing seeds when: viability is low or unknown; germination is slow; or large numbers are required. Seedlings that are germinated in trays must be transplanted into pots. Sowing in trays uses less media and saves space.

Getting started:

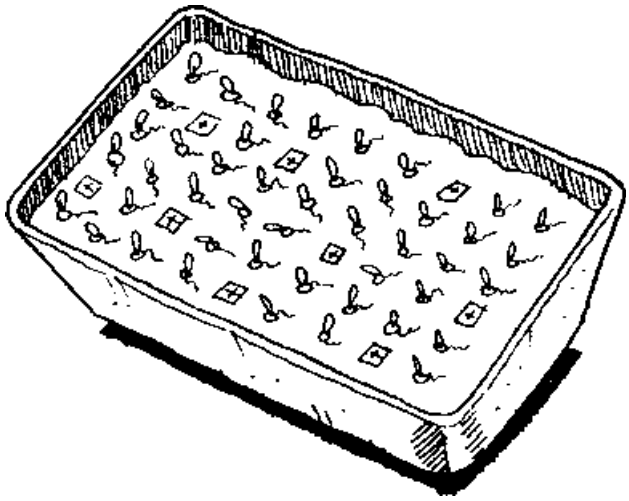
1. Fill the pot or tray to about 10 mm from the top with moist seed raising mix, allowing room for the seed and a final covering of mix.
2. Level the mix by lightly shaking or knocking the container.
3. **Large seeds** (greater than 10mm) should be pressed half to two-thirds of their depth into the mix and left partially uncovered.



Seed released after drying of fruit of: (a) Callistemon, (b) Eucalypt and (c) Acacia

4. **Medium sized seeds** such as *Acacia* can be placed on the surface of the mix by hand, with a 3-5 mm spacing between each seed. Cover seed with the mix to a depth equal to their thickness.
5. Sprinkle **small seeds** lightly over the surface of the mix. Cover seed with mix to a depth equal to their thickness.
6. **Very fine seeds** can be mixed with fine dry sand and lightly sprinkled over the mix by hand with a salt shaker or by gently taping from an envelope. A light covering of mix (about the thickness of the seed size) is then sieved over the seeds.
7. Immediately label the container with species name, place from where the seed was collected and the date of sowing.
8. After sowing gently water in seeds with a fine mist. Take care not to dislodge the seeds from the container.
9. The mix should be kept moist but not wet. A moist environment can be maintained by covering the container with a plastic bag, or careful hand watering or the installation of a sprinkler/mister system.
10. Most seeds germinate quicker during warm conditions. Germinating seeds need protection from frosts. If propagating in cool weather, gentle continuous warming of the germination containers will speed up germination.
11. Place the containers of sown seed in a shaded area (at least 50% shade) and keep an eye out for potential pests such as ants, mice, snails and caterpillars.

My seeds have germinated, what do I do now?



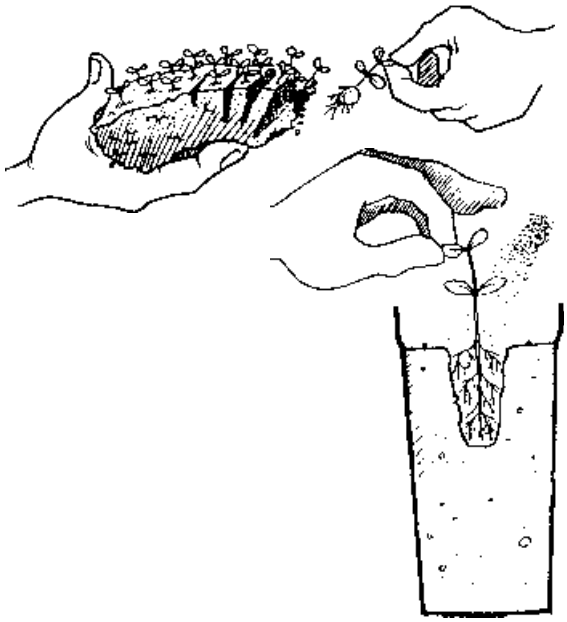
After germination has occurred, count and record how many seeds failed to germinate

Seeds sown in pots

When seeds have been sown into individual containers, sometimes more than one seedling germinates. To avoid overcrowding, tree and shrub seedlings should be thinned to one plant per pot. Herbaceous plants such as grasses may not require thinning. When tree and shrub seedlings are at the 2-4 leaves stage, select the most vigorous seedling and pull out the other poorer seedlings.

Seeds sown into trays

Seedlings in trays must be transplanted into individual pots or tubes so that they can grow on. Only the healthiest seedlings should be selected. Ideally seedlings should be transplanted soon after they have produced two true leaves.



Potting mix will be needed to fill the new pots. Commercially prepared potting mixes can be obtained from most retail nurseries. However if you wish to make your own potting mix, make sure it is well drained, well aerated, and has good water and nutrient holding capacity.

Materials used in potting mixes should be free of weeds, disease and insects. The potting mix should have a pH within the range of 6.5-7.0. Suggested recipes for potting mixes:

- 5:1 ratio of composted pine bark/sand
- 4:1:1 ratio of composted pine bark/sand/sawdust
- 2:1 ratio of composted sawdust/sand

Fertiliser should be included in the potting mix. A commercially available slow release fertiliser may be used or natural fertilisers such as dried manures and blood and bone. Alternatively liquid fertilisers may be applied when watering. An NPK rating of 14:2:7 is appropriate for native plants, especially Proteaceae.

Fill pots with potting mix and water well to eliminate any airgaps. Using a 'dibbler stick' (either a knitting needle, chopstick or thin piece of dowel sharpened on one end) create a hole large enough for the roots in the centre of the pot. Individual seedlings can be **gently** prised from the mix with the 'dibbler stick'. To prevent damage, seedlings should be handled by their cotyledons (seed leaves). **Carefully** lower the seedling roots into the hole previously made in the pot. Make certain the roots are not kinked or twisted, as this can cause premature death or stunting to the plants. Once the seedling has been correctly placed, the potting mix can be firmed around the roots using the dibbler stick. The seedling should be planted in the pot at the same level on the seedling stem as it appeared in the tray. After planting, the seedlings should be thoroughly but gently watered to eliminate air pockets around the roots.

Growing on

Your young seedlings will need special care for the next few of weeks:

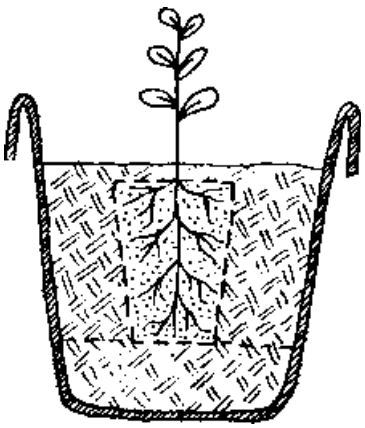
1. **Shading:** 50 % shade is adequate for most natives.
2. **Root pruning:** roots should not be allowed to grow out of the pot into the ground. This can be prevented by regularly lifting the pots. A good alternative is to have pots on wire mesh racks or shelves, above the ground, where the surrounding air stops root growth out of the bottom of the pot.
3. **Fertilising:** depending on the type of fertiliser used in the potting mix, the application of soluble fertiliser may be required. Consult your local retail nursery for guidance on fertiliser rates and regularity.
4. **Watering:** regular watering for 4-5 minutes, twice daily will generally be adequate. Missing even a single watering could result in the death of many seedlings. Frequency of watering may need to be increased during very hot and dry conditions.
5. **Weeding:** weeds will compete strongly with young plants, so weed removal is essential.

Hardening off

Hardening off is the method of preparing plants for the harsher conditions they will experience when planted out in the field. This is achieved by exposing the young plants to direct sunlight for increasing amounts of time, over a few weeks, before planting. Care must be taken that sunlight is not too intense and that the young plants have enough water. Most plants establish and grow better when planted out as sun-hardened seedlings.

Potting-up

If you can't plant when the seedlings are ready, then potting-up may be necessary. This should be done before the plants become pot-bound or 'J' rooted. Select a pot, which is wider and deeper, then the existing pot. Remove the seedling from the pot with the potting medium intact, and set it into a new, larger pot, taking care not to tangle or kink the roots. Fill the space between the root ball and the side of the new container with new potting medium, press it in firmly and then water.



Record Keeping

Record keeping enables you to monitor the success or failure of your propagation techniques. Labelling each tray, punnet or tube is an important part of this process. Each batch of seedlings should have the following recorded details.

1. Seed collection record should include:

– Collection number;
– Collector's name and collection date;
– Plant name and/or description;
– Site location and description – sketch map, topography and aspect, soil type and moisture, weather conditions;
– Habitat description – plant community, associated species;
– Number of seeds collected; and
– If samples and photos were taken.

2. Propagation records should include:

– Batch number;
– Plant name (or description) and date of sowing;
– Seed collection record reference number;
– Pre-treatment;
– Propagation mix, type of container, number in each container;
– Environmental condition such as propagation and air temperatures, watering regime etc
– Progress records – root and leaf development, weed growth, losses, pricking out, planted out/sold on;
– Propagation time; and
– Success rate.

Conclusion

When propagating don't be afraid to experiment and try new ideas, remember practice makes perfect! One of the best ways to ensure the future of our native flora and fauna is to become active in propagating 'local provenance' for your next bushland rehabilitation project.

Acknowledgment: selected text and illustrations relating to this technical note was sourced from the Queensland Department of Natural Resources Tree Facts series, T04, T17 and T19.

References and further reading

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Tree Facts T04, *Setting up a small nursery*, December 1996, Department of Natural Resources.

Tree Facts T17, *Propagation of trees and shrubs from seed*, December 1996, Department of Natural Resources.

Tree Facts T19, *Seed collection, storage and testing*, October 1996, Department of Natural Resources.

See Land for Wildlife Southeast Queensland Technical Note No.1 'General Reference List' Bush Regeneration.