LAND FOR WILDLIFE
CENTRAL AUSTRALIA
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Propagation and Revegetation in Central Australia

A Quick Guide to Growing Native Flora

Propagation and revegetation is something that may interest you at the local level, as you may be interested in revegetating your property. At a commercial level, nurseries will collect seed and cuttings to propagate stock for sale. At a national level, agencies will collect seed for storage in seed banks. In Australia, there is a National Seed Bank at the Australian National Botanic Gardens, which has a role of conservation, research, propagation and supply of seed to researchers.

While many plant nurseries will have several local native species for sale, the ability for nurseries to stock a large variety of local native plants can be limited. Collecting local native seed and germinating the stock yourself, or growing from cuttings, can allow you to revegetate an area efficiently and with species that interest you. You can germinate seeds or establish cuttings in growing houses, or conduct direct seeding for revegetation purposes. Thus, we provide some information here to assist you with seed collection in the local area to maximise your ability to propagate local native plants.

Which Species to Propagate?

Knowing what to collect in the acceptable locations is the next step. It's best to choose plants that are native to the region, representing provenance, as they will be best suited to the soil and climate. Check out the vegetation maps of Alice Springs (http://wildlife.lowecol.com.au/about/resources/vegetation-maps/) to see what plants might be best for your property.

If you are searching for particular plants, ensure that you have identified the plant correctly. There are a host of excellent plant identification resources out there to assist you, including Andy Vinter's Bush Regeneration Handbook (https://wildlife.lowecol.com.au/resources/books-for-sale/). If you have a sample you need identified, you can use the assistance of the NT Herbarium (https://nt.gov.au/environment/native-plants/native-plants-and-nt-herbarium). FloraNT also provides access to the Northern Territory Herbarium specimen data (http://eflora.nt.gov.au/). Be mindful that some sap, fruits, seeds or dust from seeds can be toxic or cause skin allergies, so handle items carefully with appropriate PPE or avoid them altogether.

Seed and Cutting Collection

Knowing where to collect seed and cuttings will be your first hurdle. Seed collection in the Northern Territory requires a permit, which can be obtained through the NT Government (https://nt.gov.au/environment/animals/wildlife-permits/permits-take-interfere-with-wildlife). This is especially necessary when you are dealing with threatened species, such as Cycads (https://nt.gov.au/environment/native-plants/harvest-cycads-from-wild). Ensure that you have a permit to collect seed from the locations that you have in mind. In addition, written permission from the landowner is required before collection can begin, including aboriginal land, roadsides, private land, pastoral properties, national parks / conservation reserves, or council reserves. There may also be sensitivity around collection from some locations – ensure that you respect and don't compromise the cultural values regarding trees and seed when collecting from an area.

Knowing when to collect the seed will enable you to get on with the task efficiently. It might help you to observe the plants you pass in everyday life and begin making a calendar of when the desired plants are flowering and when they are producing fruit. Collect fleshy fruit when they are round and full, softening, falling to the ground or being eaten by birds or other animals. Dry fruits can be collected when they are brown and woody, or fruit capsules are opening. Grass seeds can be collected when they are changing colour, when seeds strip off easily by hand or the awns are falling off. It is important to collect mature seed, though be mindful that there are some species whose seeds don't mature for several months after being released from the plant and cracking dormancy in this species is a case of waiting and being patient. Resources such as native seed guides can help to fill in the blanks and provide information on sowing techniques and dormancy strategies that need overcoming. Opportunistic collection may be necessary where seed set is irregular or influenced by seasonal factors such as rainfall.

It is best to collect seed or cuttings from a range of healthy plants and avoid collecting any more than 20 % of material from one plant, to ensure you leave enough to naturally regenerate, add to the seed bank, and provide food for animals nearby. It's wise to avoid collecting seed from isolated plants, as self-pollination often results in low viability of seed and produces specimens of low vigour. Collect seed or cuttings from several (10 to 20) plants that are widely spaced to ensure you have genetic diversity.

Seed can come in a range of vessels, including woody capsules (*Eucalyptus, Melaleuca*), papery capsules (*Dodonaea, Wahlenbergia*), seed pods (*Acacia, Indigofera*), drupes (*Santalum*), berries (*Atriplex, Enchylaena*), follicles (*Hakea, Grevillea*), nuts (no local native species), grains (*Spinifex, Themeda*), achenes (*Brachyscome, Helichrysum*), and cones (*Allocasuarina*). Find out how much seed a typical fruit of your desired species contains. For example, a *Hakea* follicle may contain one seed; an *Acacia* seed pod may contain a dozen seeds; while a *Eucalyptus* capsule may contain hundreds. Knowing how much seed a fruit contains will help you to know how much to collect to avoid taking too much. Collect a little more than you think you will use to account for poor viability of some seeds, but also avoid collecting much more than your own requirements. Use ecologically sustainable collection practices and adhere to a code of practice, avoiding damage to the environment and wildlife habitat.

Some seeds on tall trees may be out of reach and require ladders or long-handled tools. Ensure you are prepared with the tools required before you set out on your mission. You may also wish to coordinate seed collection or cutting propagation with annual pruning activities.

Seed Cleaning, Processing and Storage

Once you have collected the seed, the processing of the seed to maintain viability is integral. Clean and dry the seeds prior to storing them. For example, thick fleshy fruits should be placed in a bucket of water to remove skins and flesh, rubbed on a mesh tray to remove excess pulp, and then dried well. Woody fruits need to also be dried to crack the seed cases. It may seem intuitive to clean off some of the protective structures from grass seed such as bracts and awns, however some of these structures can assist with propagation and therefore removal should be avoided.

Dry the seed in a location that is well ventilated, dry, away from the wind and also protected from animals that may wish to eat the seed. Once dried, clean the seed to remove the pods, chaff, sticks and leaves. This can be

done by hand or with the assistance of a mesh sieve appropriate for the seed size. You may wish to weigh the seed, especially if you are working under a permit, as you may need to report on this.

When collecting the seeds you can place them in calico bags, paper bags, boxes or buckets, but ensure they are well ventilated to avoid mould killing the seed. Keep the seeds separate (location and species). Storing seeds in paper bags and screw topped jars is preferable, though zip-topped plastic bags can work for very dry seeds. Seeds may keep for several years if they are stored correctly. Store the seed in a cool, dry and vermin-proof location away from sunlight. A fridge at 1-5 ^{o}C and relative humidity of 4-8 % is optimal.

It's important to keep a good record of the seeds that are collected. Record the species, collection location, and collection date as a minimum on or in the bag that the collected seeds are stored in. You may wish to fill out a seed collection record that has more space for information such as the common name, local language name, collector's name, the location description, and latitude/longitude. You can then simply label the seed container with a corresponding seed lot number, or double up on the important information in case the paperwork is separated from the container. This way you can keep track of the seed stock during the planting process and determine what works based on the records.

Fleshy fruit should be sown immediately for the best results, or stored for a short time in the refrigerator. Woody fruit seed can be stored for several years, depending on the species. You can check viability periodically by using a float test (floating seeds are generally viable), cut test (fleshy white centres usually indicate good viability) or by growing it out to check it directly.

Propagation from Seed

Many native species will germinate readily when provided with a moist and warm environment and a media in which to grow, however, some seeds will require treatment to enable germination. As a general rule, seeds that have hard and shiny coats will require treatment. Nick the edge of hard-coated seeds or soak them in boiling water to break mechanical dormancy (*E.g. Acacias*, *Swainsona*, *Indigofera*, *Gossypium*, *Erythrina*, *Senna*), sow the seeds in a medium and conduct a smoke treatment (*E.g. Grevillea*, *Ptilotis*), remove the hairs from seeds or soak and ferment in water for several days to break chemical dormancy (*E.g. Capparis*, *Ptilotis*), or wait and be patient to cope with morphological dormancy (*E.g*. Daisies, *Themeda*). Some treatment methods are listed below:

Treatment	Method	Species
Propagation from Seed		
Hot water	Place seed into a jar and pour on boiling water. Soak from 12 to 24 hours until the seeds are imbibed.	*Acacia, Senna, Swainsona, Crotalaria*
Scarification	Clipping: Use small secateurs or snips to cut a small corner off the seed. Sandpaper: Use fine grade sandpaper to rub off a small corner of the seed.	
Leaching	Place the seed in a cloth or mesh bag and place in a bucket of water for 12 to 24 hours.	*Atriplex, Lamandra*
Fermentation	Remove seeds from the fruit and place in a container with water. Allow it to ferment for 1 to 2 weeks, or as required.	*Capparis, Solanum*
Smoke	Method 1: Sow seeds in a container and cover with 2 to 3 mm of seed raising mix. Place a layer of dry leaves or grass over the top and set it on fire. Use water to put out the fire. Method 2: Place seeds in a mesh bag and place over smoking wood. Allow to smoke for several minutes and then sow seeds as usual.	*Grevillea, Hakea, Solanum, Triodia*
Ripening	Collect and dry seeds and store for several months before sowing or sow in the following season.	*Themeda,* Daisies

If planting into seed trays, ensure that they are clean and free of dirt (wash in a sterile solution). Prepare a seed sowing mix that includes cocopeat to hold moisture and another media (such as sand, vermiculite or perlite) that will drain readily. Do not include fertiliser as the food store of the seed will be appropriate. Avoid the inclusion of large particles that may inhibit seed germination. Fill the trays and tap them on a bench to help settle spaces.

Sow the seed at a depth equal to double the seed width. Space the seeds out to avoid competition with one another. Water the seeds with a fine mist and keep them moist throughout the germination and early growth phase, but not waterlogged. Store the seed tray under filtered sunlight off the ground (to reduce insect attack and bacterial and fungal growth).

Direct seeding is also a good option to reduce potting media costs and cover large areas quickly. Directly seeded plants can also grow stronger root systems than nursery grown plants, and this results in hardy individuals. However, it can be less reliable and suffer higher failure rates due to seed predation by birds and invertebrates.

Before sowing directly into the ground, prepare the site by removing weeds and keeping control of their regeneration to prevent competition between the weeds and your seedlings. You can hand-pull weeds or deep rip the area for thorough removal. Avoid fertiliser as this will promote regrowth of weeds.

You can bulk out the seed mix with sand for hand-broadcasting over an area, or manually plant each seed to a depth equal to twice the width of the seed. Ensure that the ground is moist and if rain isn't forecast, you may need to give the area a helping hand with irrigation. Alternatively, plan your planting regime to coincide with winter or summer rains to increase your chance of success.

Vegetative Propagation

Several native species can be propagated through cuttings or division of the root stock. For example:

Treatment	Method	Species
Vegetative Propagation		
Cuttings	Remove leaves from the bottom portion of a 3 to 4 cm section of stem. Cut just below a node. Dip the cut in hormone gel or powder and place the cutting into a propagation mixture.	*Eremophila, Myoporum, Ficus, Prostanthera, Dipteracanthus*
Division	Carefully dig out the plant or remove it from the pot, gently pull apart the root ball into several sections and re-pot. Trim the foliage so that 5 cm or so fresh growth is left.	Grasses, *Triodia, Lomandra*

Cuttings and divisions should be placed into seed trays, ensuring that they are clean and free of dirt (wash in a sterile solution). Prepare a mix that includes cocopeat to hold moisture and another media (such as sand, vermiculite or perlite) that will drain readily and provide structural support for the plant. For cuttings and divisions, you can include fertiliser to help the plant remain healthy. Fill the trays and tap them on a bench to help settle spaces.

To make cuttings, use a sharp pair of secateurs to cut short (roughly 4 cm) sections of the plant, cutting at an angle just below a node. Cleanly cut off the leaves on the lower section of the cutting, leaving two or so leaves at the top. If the remaining leaves are large, consider cutting their tips off to reduce the area from which evaporative water loss can take place. Dip the cutting in hormone gel or powder to encourage the node to produce roots.

Place the cutting or divided root stock into a pre-made hole within the potting media. Space the individuals out to avoid competition with one another. Water with a fine mist and keep them moist throughout the germination and early growth phase, but not waterlogged. Store the tray under filtered sunlight off the ground (to reduce insect attack and bacterial and fungal growth).

Pricking Out and Potting Up

Seeds of some central Australian natives germinate after a few days, while others may take up to several months. Once they have got their first two true leaves (first the cotyledons that differ in appearance, and then the first two true leaves appear), and they are more than 10 mm in height, they can be pricked out and potted up into tubes. For cuttings and divisions, the sign that they can be pricked up is when small roots show through the bottom of the tray, or the cutting holds onto the soil when gently tugged. Potting up will help to encourage root growth and reduce competition with neighbouring seedlings.

A flat wooden stick or other probe can be used to slide down alongside the seedling and gently pry it out of the seedling mixture. Avoid damaging the roots as this may cause the plant to die.

Tubes for potting up should be cleaned and sterilised between uses to kill off any bacteria or fungi that have developed. They can then be filled with potting mix, a deep hole made for the roots and the new seedling slid into the hole. Ensure that all the roots hang straight down and are not curled. Fill the soil in around the roots and gently tap it on a bench to settle the soil. Water the new seedlings in thoroughly and maintain a moist (but not wet) environment. Place it in filtered sunlight initially and then gradually increase the level of sunlight to harden it up.

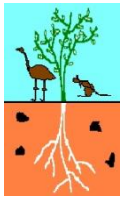
Once the roots are poking through the bottom of the seedling tube they can then be replanted into larger pots or placed in the ground.

Tree Planting

Plants are ready to be planted out when there is a healthy growth of leaves and roots are showing at the base of the pot. However, in selecting a location to plant it you will need to consider the shape and size of the tree at maturity, the suitability of location with respect to habitat, distance from infrastructure and soil type.

Once a site has been selected, prepare the area by removing weeds and digging a hole that is twice the diameter and depth of the original container. Water the area in and allow it to drain before planting. Place a hand over the container opening and tip it gently upside down and give the pot a tap to remove the seedling. Avoid tickling the roots of native plants as they are fragile and it may damage them. Place the plant in the hole and back fill the surrounding area with moistened soil. Water the plant well. Mulch the surrounding area with leaves and mulch from the surrounding area, keeping a small area around the stem free as this can promote rotting.

Provide regular deep watering of the seedling to until it is well established, and then gradually reduce the frequency of watering to encourage deep root growth and harden it up for drought resistance.



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