

TreeProject

GROWER MANUAL

A guide to propagating
indigenous seedlings

See your Grower Report for details of
Your Landholder
Your Area Coordinator

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Epacris impressa – Common Heath
Victoria's State Floral Emblem Drawing by
Marion Westmacott
Courtesy of the Australian National Botanic
Gardens www.anbg.gov.au

Checklist for growers

Here is a Checklist to help ensure will be growing healthy, happy seedlings. Please make sure you read these carefully and follow them throughout the growing season.

- Read the grower manual from cover to cover
- Check if any of your seed needs treatment before sowing (see seed packet and appendix 1 of this booklet). Some species may need to be stored in a cool dark cupboard, fridge or be heat treated. Avoid spoiling a planned sowing day by realising at the last minute that your seed needs to be refrigerated for several weeks
- Follow the hygiene guidelines carefully
- Sow each box by the specified sowing date (when growers sow at the same time seedlings are ready for transplanting at the same time and you can share them if needed)
- Moisten the loose potting mix before packing it into the tubes
- Remove and recycle the piece of newspaper used for lining the boxes
- Fill each tube snugly with potting mix, bumping it on a hard surface to remove air gaps and tap top of soil gently with bottom of another tube
- Check you have sown the seed at the correct sowing depth (see p. 21)
- Cover your seed with a layer of gravel
- Write one label per box specifying the species name, sowing date, your name and landholder's name
- Place your boxes in the sun, raised off the ground (with shade cloth until germinated)
- Water thoroughly twice a day until seedlings germinate with a fine gentle spray, then once per day in summer, less as the weather cools (see p 15)
- Get in touch with your area Coordinator and keep in regular contact
- Record your seedlings progress via the online link provided by your Coordinator

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Introduction and Welcome

Dear Grower

Welcome, and thank you for being a volunteer grower for TreeProject. Volunteer growers are the backbone of our program - it is your time, effort and care given freely to raise the seedlings that makes it all possible.

All of the seedlings you will be growing are locally indigenous to the area they will be planted and will be part of a long-term revegetation project. TreeProject aims to only grow locally indigenous species as these are genetically adapted to the climate and geology of the area, will not become weeds, and provide food and shelter for local wildlife.

We appreciate your contribution, but growing seedlings is a big commitment. TreeProject staff, fellow volunteer growers and your volunteer coordinator are here to help you through this process.

Growing indigenous seedlings is usually straight forward, particularly if you have grown other plants before. However it is important that you follow the directions in this booklet, and ensure you contact your coordinator or TreeProject immediately if you encounter any difficulties. Many problems can be remedied if attended to early on.

Your tree-growing kit consists of the following items:

1. A 'Grower Report'. This tells you who you are growing for, how many trees of each species you are growing for the landholder, the contact details of your area coordinator and who your fellow growers are
2. Grower manual
3. 7 packets of seeds with species name, sowing date and other instructions. One packet per box
4. 7 labels and a waterproof pencil for species identification. 1 label per box
5. 7 boxes of potting mix and fertiliser
6. A bag of forestry tubes (small black pots). 48 per box, 336 per kit
7. Gravel mulch – enough for a thin layer across each tube
8. Smoke treatment if needed.

Do not sow seeds now - check the seed packets for sowing dates. Sow your seeds on or very near the sowing date on the packet so that your seedlings are ready for transplanting at the same time as others in your group. That way you can share extra seedlings if needed.

Check now that you have all these items, including the seed

If anything is not quite right or missing, please contact the TreeProject via email or phone.

The Grower's Responsibilities

- grow healthy seedlings as per the instructions
- contact your area coordinator if you experience any difficulties
- respond to your coordinator when they are requesting seedling updates and complete the monthly seedling tracking table. Seedling tracking helps us to identify shortfall early in the season and allows us to source replacement seedlings from other growers
- work with your Coordinator to arrange collection / delivery of the seedlings for the Landholder
- helping to plant the seedlings is optional however many growers find it extremely rewarding to plant out the seedlings they have grown.

Communication is important to the success of the program. Your coordinator is a volunteer - just like you - so it's important to be responsive and keep in contact

By 'healthy seedlings' we mean seedlings that are:

- Looking robust and well-nourished
- Growing in a well filled tube
- Thinned out to one seedling per tube
- 15-30 cm high (depending on species) and have a well-developed root structure
- Ready to be planted out into a prepared site



Well-developed root structure holds the soil in a firm shape

To grow 'healthy seedlings', experience shows that the following are essential:

- A bench in full sun, for your comfort, plant hygiene and pest avoidance
- Shade cloth to cover the bench for sowing, germination and for a period after germination. Shade is also essential for transplanted seedlings for two weeks
- Being conscious of extreme weather conditions - protect your seedlings from hot northerly and coastal winds, heavy rain, hail and severe hot days
- Well filled tubes
- Correct pre-treatment and timely sowing
- Correct watering. Water thoroughly twice a day till seedlings sprout with a fine gentle spray, then once per day in summer, less as the weather cools
- Careful observation and prompt problem solving.



General information

Our Vision

TreeProject gets urban and rural communities working together to put trees back on the land. Our network of trained volunteers grows indigenous seedlings for rural landholders and Landcare groups who need our help with revegetation.

To support this vision, our volunteer growers grow one strong seedling in every tube ready for planting in either autumn or spring. If you follow these instructions, you should be able to achieve this. However sometimes problems do occur, so we provide 30% extra propagation materials to cover any losses or low germination rates.

Timeline

Seedlings need to be ready for planting-out in either autumn or spring. This will require you to prepare and fill tubes and sow to a timetable, so get organised to save yourself last-minute pressure.

Growing group

You are part of a network of over 400 growers and a smaller growing group of around 6-7 growers supported by a volunteer coordinator. Some growers will have too many seedlings while others may not have enough. Your growing group is the place to share seedlings, ask questions, share your experiences and support each other.

If you need extra seedlings to fill your tubes your growing group is there to help. If you need someone to look after your seedlings start with asking your growing group – you may be able to return the favour down the track.

Growing your seedlings is a 6-month commitment and involves checking seedlings daily for pests, regular watering, thinning out and maintaining contact with your area coordinator.

Storing your seed

Keep seed in a cool, dry and dark place until sowing-day - unless otherwise stated on the seed packet. Some seed needs to be kept in the refrigerator. Put the sowing dates found on your seed packets in your calendar so you don't forget.

Read the instructions carefully before you start and refer to them again as the growing season progresses.

TreeProject is concerned about the possible adverse effects of introducing 'foreign' genetic material into the rural environment. Hygiene is important as this prevents pathogens, disease or weeds from affecting your seedlings or being introduced into rural areas. To prevent this from occurring it is important to follow these instructions carefully.

Need Help?

If you have any questions or problems, contact your area coordinator or the TreeProject office. We are here to support so get in touch. Your coordinator should be your first point of contact. You can also contact the TreeProject office on (03) 9650 9477 or info@treeproject.org.au

Resources

There are loads of videos, photos and informative tips on the TreeProject [website](#). Have a browse and check out the short videos.

Keep in touch:

Keep your coordinator informed about the seedlings' progress during the season. This assists the coordinator with arranging sharing of seedlings at transplanting time between growers that have extra seedlings and growers that have a short fall.

Preparation

Choosing your site

For the first weeks while your seedlings are germinating choose a position where they will receive only morning sun or are covered with shade cloth.

If this is not possible, construct a frame and put light weight shade cloth (white) over the tubes so that the soil does not dry out in the hot afternoon sun.

Note: Please don't use a glass house, poly-tube or enclosed shade house - they are far too hot and humid for our native species during the summer growing season and can produce weak seedlings and encourage fungal infections. The seedlings will be planted out in a harsh rural environment, they need to be tough to withstand all weather conditions.

Full Sun is important

Once your seedlings are established (*2 weeks after transplanting or when seedlings have four leaves*) they will need a full day's sun to become hardy enough for the harsh conditions they will have to survive after planting out.

If your seedlings are really thriving and begin to get too large, return them to the morning sun position or shade cloth and reduce watering to slow down the growth. But remember to remove the shade-cloth a couple of weeks before the seedlings are collected to 'harden-off' the seedlings. White shade cloth is best as it reflects heat whereas darker shade cloths tend to absorb heat.

Climate and Weather

Climate and weather will affect the germination and growth of your seedlings. Cool wet summers can impact germination and slow seedling growth. Extreme heat can stress and damage seedlings. A warm summer with temperatures averaging 28 degrees is ideal for TreeProject seedlings.

Wind

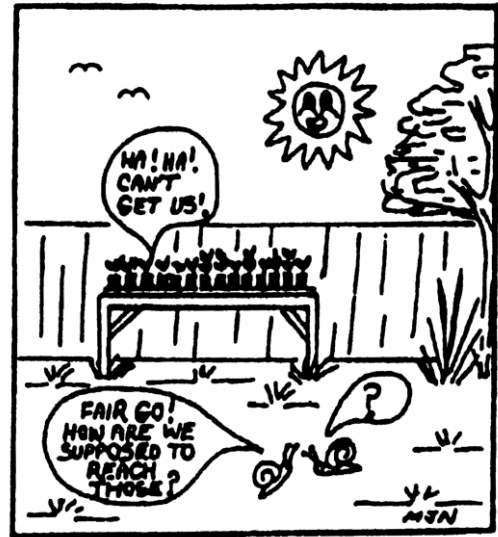
Persistent hot winds cause high moisture evaporation. The soil will dry out and tiny seedlings, particularly if just emerging, will be damaged. Shelter from the prevailing winds will help prevent this.

Note: It's important to listen to weather forecasts, this will enable you to take the right action to protect your seedlings from severe weather conditions.

A Raised Bench

Benefits of a raised bench

- Allows air to circulate around the seedlings
- Keeps seedlings off the cold ground in winter
- Discourages ants, snails and other creepy crawlies
- Discourages weeds and other garden material from contaminating seedlings
- Protects seedlings from dogs/cats/small children
- Places the seedlings at a comfortable and safe working height.



Construct a raised bench or platform out of whatever is handy - it does not need to be elaborate but must be sturdy. A weld mesh top is best. An old bed frame is used by some of our growers. Bricks and planks are ok but can harbor snails and slugs. If your bench top is solid like a tabletop, place thin strips of wood or tubing to give breathing space between the boxes and bench top.

If you cannot make a bench, the minimum requirement is a 10 mm air gap under the growing box on a brick or concrete area.

Sowing dates

Our recommended sowing dates are on the seed packets and Grower Report. Dates are staggered as some species grow faster than others. The aim is to have all the seedlings ready to share between growers at transplanting time.

Hygiene

It is important that a high standard of hygiene is maintained when setting up and caring for your seedlings.

Following these hygiene protocols will ensure that you do not contaminate your seedlings or their potting mix with

- soil borne pathogens
- diseases
- weed seeds or other plant matter.

Your seedlings will be planted out in the rural countryside, and the last thing we want to do is introduce disease, weeds or pests into the environment. Most noxious weeds have escaped from ornamental gardens, so the risk is very real. The tubes and boxes you receive have been sterilised and are free of disease and pathogens. A few simple, effective measures will avoid introducing diseases into your propagation set-up.

These measures will ensure that your seedlings are disease free and have the best chance of growing into healthy plant.

Seedling health

To ensure the highest standard of hygiene is met, please ensure that you -

1. Wash your hands thoroughly with soap and hot water before commencing work
2. Use only the potting mix provided ... no garden soil, compost, etc.
3. Grow your seedlings on a raised bench away from ordinary garden soil and other garden material as well as ants, slugs, pets, etc.
4. Mix the fertiliser into the potting mix in a clean wheelbarrow or on a clean bench-top ... not on the ground
5. Wash the bench-tops, trowels and other tools, with disinfectant (household bleach 20 ml per litre), or tea-tree oil before use
6. Do not allow ordinary garden soil to come in contact with your potting mix. It may contain harmful organisms and weed seeds which we don't want to introduce to rural farms
7. Wash your hands

Your Health and Safety

While our aim is to produce healthy seedlings, we also want our volunteers to enjoy their growing experience and take precautions to ensure it is also a healthy endeavor. While growing seedlings is a fairly low risk activity, there are a couple of safety precautions to keep in mind.

Lifting

Full boxes weigh approximately 12 kilograms. Please ensure that when you are lifting your boxes you bend at the knees, without putting strain on your back. If you have back trouble or find the boxes too heavy, please get someone to help you lift them.

Hygiene

Hygiene is important not only for the health of the seedlings, but for your safety. Please ensure you wash your hands after potting up and managing your seedlings. While mostly low or non-toxic, the growing kit does contain:

Potting Mix

May carry bacteria or pathogens, as it does contain organic material. While generally a sterile mix, there is a low risk of contamination. There is also a slight risk of inhaling pathogens such as the *Legionella* bacteria which can lead to Legionnaires Disease.

- Wash hands after handling potting mix
- Be sure mix is damp to prevent inhaling dust
- Work in a well-ventilated area (though out of the wind so that seed does not blow away)
- Be careful not to put anything in your mouth that you have been handling while working with the potting mix
- You can wear a dust mask, available at most hardware stores.

Seed

Some seed has been treated with insecticide. While usually in very small amounts, insecticides are poisonous.

- Before sowing, store seed away from children and wash hands after handling
- Wash hands between handling different batches of seed to avoid cross contamination
- If pre-treating seed with boiling water, please ensure you dispose of the water carefully.

Chemical Handling

It is not uncommon for seedlings to get attacked by insects, mildews or funguses. If this happens, there are a number of ready mixed preparations that can be used (see appendix 2). When using chemicals, please ensure that you follow the manufacturer's directions, store away from children and pets and dispose of empty containers carefully. Head to our website for tips on controlling pests and disease <https://treeproject.org.au/grower-manual/pests-and-disease/>

Workspace

If you construct or set up your own bench, please ensure that it is sturdy enough to carry the weight of the boxes. A kit of 7 boxes can weight around 80 kilograms. A wobbly or unsecured bench could fall on children and pets, potentially causing injury.

Preparation and Filling the Tubes

The filled tubes are the growing environment for your seedlings. It is very important that they are filled properly to ensure the seedlings have the best chance to develop a healthy root system. We cannot overemphasise the importance of this step. Time spent filling tubes is critical to the life of the plant and it makes all the difference to growth and survival.

The Steps:

1. Prepare the potting mix.

In the centre of your box of soil, there will be a pile of fertiliser near the surface. Mix the fertiliser evenly into the box of soil. This is best done in a clean wheel barrow or large plastic tub.

Moisten the loose potting mix before filling the tubes. The mix should be damp enough to clump when squeezed in your fist but not so damp that it drips and falls apart. Damp potting mix is easier to pack firmly into the tubes and reduces dust. If the potting mix dries out, it is very difficult to wet properly once it is in the tubes.

2. Fill the tubes.

This is a time-consuming business, and if you organise a friend or two to help it is much quicker and more enjoyable. Most people take about 30 to 45 minutes to fill a box of tubes. The tubes can simply be used to scoop up the potting mix.

The most important thing is to fill the tube snugly so that there are no air gaps in it.

Bump it on a firm surface to settle the contents, and top-up if necessary.

Tap the top of the soil with the bottom of another tube to firm soil - **do not press hard or pack the soil mix down with your fingers** - this will cause the soil to be too dense and the water will not be able to flow through.

If the soil is too loose the water will flow through too fast and the roots will not develop strength. Fill to within 10 mm of the top.

You can also use a trowel or narrow scoop to fill the tubes.

3. Pack the tubes back into the polystyrene box, remembering to remove the newspaper, which can be recycled or mulched. Tilt the box to prevent the tubes falling over, pack the tubes into the box in neat rows. Pushing their bottoms together will help fit the required number into the boxes - 48 tubes.

Note: Potting mix which has been placed in the tube days prior to sowing and has totally dried out before sowing should be soaked in a trough until wet through. Remember the hygiene requirements - and clean the tub.

Pre-Treatment of Seed Before Sowing

Seeds of some species require pre-treatment to help break their dormancy. If pre-treatment is not applied, your seeds will not germinate. Some species require smoke treatment to stimulate germination. TreeProject will provide this with your growing kit if needed.

Please refer to Appendix 1; particularly note species requiring several weeks of refrigeration.

Seed dormancy is an adaptation that prevents seeds from germinating during unsuitable ecological conditions. Some species require heat, cold or fire to germinate.

Sowing

Sow the seeds on or near the dates shown on the seed packets

Sowing dates may be staggered as species germinate and grow at different rates. We aim to have all the seedlings ready at the same time. Check your sowing dates and plan ahead.

Growers need to sow each species at the same time so that you can share seedlings if needed at transplanting time.

The Grower Report will tell you how many of each species to grow. There will be one packet of seed for each box (48 tubes).

Step 1 Check to see if your seeds need any pre- treatment and follow directions where required

- Step 2 Ensure the soil in the tubes are still wet all the way through by watering just prior to sowing. Test this by emptying out one tube from each box (then fill it up again). If dried out, dunk tubes in a bucket of water to wet thoroughly
- Step 3 Write the species name and sowing date on the labels with a waterproof pencil (supplied in the grower's kit). Landholders and project coordinators need to be able to identify seedlings to ensure they plant them in the suitable locations. i.e. so they don't plant dryland tea trees along a creek or river red gums on the top of a hill. If the labels fade over time, please write them again
- Step 4 Empty the packet of seed you are about to sow onto a clean saucer and divide it up to give you an idea of how much seed per tube. Some seed packets contain chaff as well as seed - it is unnecessary to separate it but do mix the seed and chaff before dividing it up on the saucer. Sow all the contents of the seed packet even if you think there is more than needed. Spread the seed over the whole surface of the tube, not just in the centre. This will make thinning and transplanting much easier

Fine seed - sow fine seed e.g. Eucalyptus, onto the surface of the damp soil mix. Mix the seed well - some Eucalyptus seed has a lot of chaff - the dark heavier particles are the seed (which tend to sink to the bottom of the mix)



Larger seed e.g. Acacias - see the seed treatment pages for specific information. Most large seed need to be covered to its own depth with soil, which means if a seed is 3mm thick, then sow it 3mm deep



- Step 5 Sow seed onto damp potting mix, use **all** the seed in the packet. Refer to Appendix 1 for special requirements and sowing depth for seed type. Avoid sowing fine seed outside on a windy day – there is nothing worse than your seed blowing away!

- Step 6 Place a thin layer of gravel on top of the seed to:

- hold the seed close to the potting mix
- prevent the seed from being washed away
- act as a mulch during the heat of the day

- Step 7 Settle the seed in by watering with a **fine mist** - too strong a stream of water will wash the gravel and seed away

Some seed has low viability which means not all seeds will germinate successfully. The viability of some species is as low as 20%. That is for every 10 seeds sown, only 2 will germinate. Therefore it is important to sow all the contents of your seed packet, even if you think there is too much

Watering

Watering is a vital part of the growing process.

Thorough watering will ensure that you have healthy and robust seedlings. Too much or too little water can cause problems during the growing season. As the weather conditions change, so must the watering regime. However, with a little care and observation of your seedlings, you should not experience any difficulties.

How to Water

Water with a **gentle, fine spray** using the 'soft' or misting setting on your hose rose. Misting sprinkler systems can also be set up (refer to Appendix 3). Water from above, rather at an angle for as long as it takes to thoroughly drench the soil. This will be when water begins to drain out of the bottom of the tubes.

Any method which fills the tubes to overflowing or disturbs the gravel will wash the seeds up and away.

Forceful pressure will blast seeds out of the tubes.

Always water thoroughly - the water must wet all the potting mix in the tube. Ensure the tubes at the edge of the boxes are getting enough water.

At all stages through the growing season, the seedlings should never dry out completely. Be vigilant and check your seedlings daily.

When to Water

During germination (usually first 6 weeks) and when seedlings are very small, water using a very fine mist setting on your adjustable trigger hose nozzle in the mornings and late afternoon. A third watering in the evening will help if it is very hot. It is imperative to keep the potting mix constantly moist. If you fail to do so, you could lose all your seedlings on one hot day! This means hand watering or setting a timer for up to 5 minutes per watering.

- When established, a thorough watering once a day in the morning may be enough in moderate weather, but the afternoon watering is good insurance particularly in hotter areas
- When autumn starts and the days get a bit cooler watering every second day may be sufficient – but always check with your coordinator. Ensure in cooler seasons you only water in the morning to avoid mold forming on leaves in winter.

Capillary Watering or Bog Method

This method allows water to be absorbed from the bottom of the tube and encourages strong root development. By watering from the 'bottom', seedlings grow deeper roots because they need to reach to absorb water from below.

Place tubes in a plastic tray (cat litter trays are ideal) or Styrofoam box lined with plastic. Fill the tray with water up to 8mm or a $\frac{1}{4}$ of the way up the tube. Ensure there is a drainage hole at this level so the water does not get too high – remember we want to encourage root development.



The water bath or bog still needs to be refreshed daily otherwise algae and other contaminants can form. Seedlings can sit in 8mm of water ($\frac{1}{4}$ of the way up the tube) until they have germinated and stand at 10-12mm high. From this point on, remove tubes from the water bath and water from the top ongoing.

A Few Tips

Always water according to the weather, and the seedling's needs

In cooler weather, ensure that you only water in the morning. Watering in the evening encourages fungal diseases as the plants stay wet overnight (see appendix 2 for more information). It also encourages snails and slugs to graze on your seedlings

Ensure you change the setting on your automatic watering timer as the season changes leading into autumn and leading out of winter

Make sure that if your hose has been sitting in the sun, flush any hot water out first. The hot water in the hose can get to temperatures of 60 degrees C° or more, which can kill your small seedlings in one hit. Empty the hot water into a container for use elsewhere.

If by chance your seedlings do dry out completely (we hope not!), try soaking the entire box in a tub of water.

Over watering will cause disease (collar rot) or will eventually drown the seedling

If you water correctly and give your seedlings plenty of direct sunlight, your seedlings should be healthy and bushy. If you are watering adequately and your seedlings look limp, check out our trouble shooting section. If you are unsure, contact your coordinator immediately – problems caught early are easier to solve.

Germination

To germinate, seeds require:

- warmth (the sun)
- water (you supply that)

Different species have different germination rates. For example, **Melaleucas** are slow growing compared to **Acacias** and **Eucalypts** but they should get up to about 10 cm by planting time. The fastest growing species are some of the larger growing eucalypts, most notably **Eucalyptus camaldulensis**, which is why we ask you to sow that seed later than all others.

Some species may also have staggered germination rates – this is natural. Most species will begin to germinate after two weeks – but some may take a month or more.

Some species e.g. *Allocasurina* lean over when they first germinate. Rest assured they will right themselves in time.

What will the trees and shrubs look like when they germinate?

The first leaves to appear will be the **cotyledons**, which are part of the embryo of the plant and quite different to the others. As the seedling grows, the first pair of its true leaves will appear. Some species have different **juvenile leaves** than when they reach maturity. For example, many Acacias have bipinnate juvenile leaves, for some Acacias these will change into solid phyllodes as they mature.



Two types of Acacia foliage

Some Acacias can have two types of foliage at the same time. Most Acacia's start with bipinnate (feathery foliage) and in some Acacias these will develop into phyllodes (leaf like). This photo of an *Acacia melanoxylon* seedling has both types of foliage

A young Eucalypt seedling with two cotyledons (lower)



A typical Eucalypt seedling (6 months)



A typical Leptospermum seedling (6 months)



What will grasses look like when they germinate?

A grass will grow as a miniature form of the fully grown plant.

If your seedlings have not germinated after the allotted time, contact your coordinator or the TreeProject office. Sometimes we find that some seed just isn't viable. We may be able to provide a replacement batch of seed.

Thinning seedlings

Our aim is to have one healthy seedling in each tube

Thinning out or culling seedlings seems destructive and counterintuitive to what we are trying to achieve. However it is an essential part of cultivation and natural environments. Plants compete for space, sun, water and nutrients so if we have multiple seedlings trying to occupy the same tube then all will be impacted resulting in weak and unhealthy seedlings susceptible to disease. By removing all but the healthiest seedling, you are setting that plant up for success. When it comes time to planting time, tubes with multiple seedlings can not be planted and are often discarded.

Before thinning please contact your coordinator in case another grower needs your excess seedlings

How to thin seedlings

Excess seedlings should be removed by cutting them off right at the very base with a sharp pair of scissors. Ensure to follow hygiene requirements and clean any scissors prior to use. Snipping off the seedlings means that the roots of the surviving seedlings will not be disturbed.

When to thin seedlings

You should thin when the seedlings have four leaves or are large enough to handle. Cut off all but the strongest seedlings, leaving no more than 3 per pot.

Later, when the seedlings are 30 - 60 mm tall, thin out to one strong seedling per tube, leaving the strongest and healthiest seedling. Cut the excess seedlings off at the base.

If some of your tubes do not have any seedlings in them then you can transplant excess healthy seedlings from other tubes to make up numbers. Before doing this please see Appendix 4

Grasses

Grasses should not be thinned. It is preferable to have multiple grass seedlings clumped in a tube.

Presentation of Your Trees

At the end of the Growing season, you should aim to have:

1. One (only) strong plant in each tube
2. At this stage, discard any empty tubes and any very poor seedlings. (Return the empty tubes to TreeProject)
3. Seedlings should ideally be between 15 and 30cm for trees and shrubs, or smaller for ground covers. If the seedlings are getting a bit big, contact your coordinator to inform them their seedlings are ready
4. No weeds. We do not want to be responsible for introducing weeds onto your Landholder's property. Remove all weeds that grow in the tubes
5. No slugs, millipedes, caterpillars, etc. We do not want to introduce pests
6. Boxes are clearly labeled. If your labels have faded, use the waterproof pencil to write new ones. Identification is important; often seedlings look very similar – and your landholder might need the label to identify the seedlings. Labels must have the species name on one side and the landholder & grower name on the other
7. If some seedlings haven't germinated, you can rationalise the boxes by mixing species – but make sure that the different species are separated by newspaper or a wooden barrier. And ensure that each species is clearly labeled
8. Remove excess roots from the bottom of the tubes – they will need to be trimmed before planting
9. Water the seedlings well for the trip to their new home.

Healthy Seedlings:

Usually we take seedlings that are 15 cm or larger – however smaller seedlings can be ready if their root system is established enough to support growth.

Check your tubes – if your seedling root system cannot hold the soil together they will need a weak solution of [‘Seasol’](#) to encourage root system development.

Delivery and Planting

It is the landholder’s responsibility to pick up the seedlings. However TreeProject does try to facilitate delivery of seedlings when it can. If the landholder is collecting, your coordinator will organise with the landholder a suitable time and a central location for them to collect their seedlings. Please deliver your seedlings to this central place so the landholder does not have to drive to multiple locations to collect their seedlings.

There may be opportunity for you to deliver seedlings to the planting site yourself, giving you a chance to see where your seedlings will be planted. You may even want to join in on a planting day. If so, let your coordinator know so they can plan what they need to do.

- Please ensure that all boxes are clearly labeled with species your name and the landholder name
- Tubes without seedlings – empty soil into your garden and deliver empty tubes to the Kensington depot – by arrangement or when you pick your kit up for the next growing cycle. Or bring them along when you attend one of the working bees at the Kensington depot to wash and recycle tubes

Appendix 1 - Table of Sowing Requirements and Germination Times

Species	Treatment Before Sowing/Notes	Sowing	Germination
ALL GRASSES Poa, Themeda Austrostipa	None	Surface sow. Firm the potting mix. Thin layer of gravel	Varies 2-3 weeks 2-3 weeks 3-10 weeks
Acacia species	All acacias need hot water treatment. See below for method	Sow 1 cm deep Firm the potting mix gently. Thin layer of gravel	15-30 days
Acacia stenophylla	Nick out a small section of the hard seed coat. Do not damage the seed inside	Sow 1 cm deep. Firm the mix. Thin layer of gravel	10-28 days
Allocasuarina species and Casuarina cristata	The outer seed coat holds moisture. Therefore water every second day. Allow mix to be drier than other species	Cover with half cm potting mix, firm down gently. Thin layer of gravel	2-6 weeks
Atriplex	None	Cover with one cm of potting mix and firm down gently. Thin layer of gravel	2-4 weeks
Banksia marginata Banksia spinulosa	Keep mix moist only, not too wet. Sow in Winter. Requires smoke treatment and cold treatment	Cover with half cm of potting mix and firm down gently. Thin layer of gravel	2-8 weeks
Bracteantha	As for Helichrysum	Surface sow/ fine layer gravel	7-20 days
Bursaria spinosa	Winter germinating, sow early June. Needs cold days 10° and cold nights below 5 degree. Prone to damping off (see appendix 2)	Sow on top of firm damp potting mix. Thin layer of gravel	3 months
Callistemon species	Keep potting mix moist at all times. Seedlings are so fine the first 2 weeks capillary watering could help	Sow on top of firm damp potting mix. Thin layer of gravel	14-28 days
Callitris species	Fridge for 2-4 wks. Sow March. smoke treatment required	Sow 1 cm deep. Thin layer of gravel	4-8wks
Cassia	Hot water and soak as for Acacias. Can be nicked like Acacia stenophylla	Sow one cm deep. Thin layer of gravel	10-30 days
Cassinia	Smoke treatment	Surface sow /thin layer gravel	14 – 28 days
Clematis	Clematis Pubescens requires smoke treatment	Cover very lightly. Light enhances results	
Coprosma	Soak seed in tinned tomato soup 1-2 days. Grown easily from cuttings		4 weeks
Danthonia	Sow in Spring		3-5 weeks
Daviesia	Boiled water soak 12-15 hours	Sow on top of firm damp potting mix. Thin grave	14-21 days
Dianella	Smoke treatment	Sow late Summer to Spring	
Dillwynia	As for Daviesia	as for Daviesia	14-21 days
Dodonaea	Very hot water soak 12-15 hours	Sow ½ cm deep, thin layer of gravel	14-21 days.
Eucalypt species	The following species require refrigeration prior to sowing for () weeks: Eucalyptus delegatensis (6-10 weeks) Eucalyptus dives (3 weeks) Eucalyptus macrorhyncha (2 weeks) Eucalyptus nitens (3 weeks) Eucalyptus pauciflora (3-6 weeks) Eucalyptus regnans (3-4 weeks)	Sow on top of firm damp potting mix. Thin layer of gravel	7-30 days
	Eucalyptus willisi (4-6 weeks)		

Species	Treatment Before Sowing/Notes	Sowing	Germination
Geranium	Hot water treatment for 30 minutes only	Sow on top of firm damp potting mix. Thin layer gravel	unknown
Goodia (not Goodenia)	As for Daviesia		14-21 days
Haeckeria	None	Lightly cover	
Hakea	Smoke Treatment	Sow seed, sprinkle smoke treatment then cover with thin layer of gravel	3-6 weeks
Hardenbergia	Dry heat at 90c for 1 hr	Sow 1 cm deep. Firm the potting mix. Thin layer gravel	3-6 weeks
Helichrysum	Prone to damping off (see appendix 2). Avoid watering leaves. Surface sow. Water from the bottom of tube only – capillary watering	Sow on top of firm damp potting mix. Cover with a thin layer of gravel	14 - 28 days
Hymenanchera	As for Bursaria	Sow 1/2cm deep. Thin layer of gravel	9 weeks or more
Kennedia	Hot water treatment boiling water over seed allow to soak 4-8hrs	Sow 1 cm deep Firm the potting mix gently. Thin layer of gravel	unknown
Kunzea	Keep mix moist, not wet. Smoke treatment	Sow on top of firm damp potting mix. Thin layer of gravel	15 – 45 days
Leptospermum	Keep potting mix moist at all times Smoke treatment	Sow on top of firm damp potting mix. Sprinkle smoke treatment and then thin layer of gravel	15-45 days
Melaleuca species	Keep potting mix moist at all times. Likes 18 to 25 Degree temp	Sow on top of firm damp potting mix. Thin layer of gravel	10-30 days
Olearia	Smoke treatment.	Sow Autum through Spring. Cover lightly	3-5 weeks
Ozothamnus	As for Helichrysum + Smoke treatment	As for Helichrysum	14- -28 days
Pittosporum phylliraeoides	Seed has chemical inhibitor in sticky coating, removed by washing. Mix solution of warm to hot water and detergent. Rub seeds between hands in the solution. Soak in fresh water for 24 hours, then sow	Sow 1 - 1.5 cm deep. Firm potting mix down. Gravel - 2 layers. It is important that seed is well covered with soil	4-14 weeks
Podolepis	As for Helichrysum	Sow on top of firm damp potting mix. Thin layer of gravel	unknown
Prostanthera	Smoke treatment	Sow late winter/early spring. Cover lightly	3-10 weeks
Pultenaea	As for Daviesia	Sow on top of firm damp potting mix. Thin gravel	14-21 days
Solanum	None	Sow ½ cm deep / thin gravel	3-6 weeks
Spinifex	None	Cover seed trays or sow seeds fairly deep. Will germinate in presence of light	
Viminaria	Hot water treatment boiling water over seed allow to soak 4-8hrs	Sow 1 cm deep. Firm the potting mix. Thin gravel	7 – 14 days

Hot Water Treatment

Put the seed into an appropriate container and pour on water that has just boiled. Soak for 12-15 hours and sow the seeds which have swollen. Treat again those not swollen - soak again and sow. Any seeds that float or do not swell should be discarded as they are infertile.

Appendix 2 – Problems and Trouble Shooting

This is a guide to some common difficulties experienced by growers. However, if you stick to the guidelines, including hygiene, full sun, watering, raised benches, and good air circulation, you will keep these problems to a minimum, if at all.

The most important thing is to be observant and vigilant. If you have any problems, make sure you get on top of them as early as possible – the longer you leave it the more likely your seedlings will suffer.

If after consulting this guide you are still experiencing difficulties, please contact your area coordinator.

No Germination?

If your seed has not germinated 4-6 weeks after sowing, and it is indicated in Appendix 1 that it should have, you may need to re-sow. Let your coordinator know and they may request more seed from TreeProject.

Before requesting more seed, ask one of the experienced growers to check out your propagation set-up.

Occasionally poor seed quality is responsible, but often it is operator error, so check the following before requesting more seed:

- Position in the sun - is the potting mix warm enough? Tubes need to have as much sunlight as possible to create the warm environment in which seeds need to germinate. Full sun is best, but morning sun is preferable if you must choose.
- Are the boxes off the ground? Very important, as snails or other pests could be getting to them. It also allows the air to circulate around the boxes to prevent water logging and keeps them separate from the colder ground.
- Ants. Keep ants off the boxes - they are expert seed collectors! You can put containers of water under the legs of your bench to stop ants climbing up.
- Quantity and technique of watering - are you watering enough to keep the potting mix moist at all times? Any method of watering which fills the tubes to overflowing and/or disturbs the gravel can wash the seed up and away. Look for seeds germinating between the tubes. Forceful pressure will blast seeds out of tubes, so ensure you are using a fine spray.

- Did you follow the pre-treatment and sowing instructions? Acacias and other hard coated seeds will not germinate without appropriate pre-treatment. Large or winged seeds not covered with sufficient soil will wash up through the gravel and dry out on top. Replant about 10 mm deep and firm down. Replace gravel.
- Slugs and snails. Have they eaten the emerging shoots? Check down between the tubes and under the boxes. Water at dusk (make an exception to the no-watering-at-night rule) and do a torchlight search. Dispose of the slugs or snails as your conscience permits.
- Is fine seed sown too deep - e.g. melaleucas and callistemons? It is important to follow instructions on sowing depth.

After Germination

If any of your seedlings are wilting, look weak at the base, are falling over or going rotten, it could be due to 'collar rot' or 'damping off'. They have similar symptoms but are due to different factors. It is important that you attend to this without delay otherwise you may lose everything. These problems usually occur when the seedlings are very small.

Collar rot occurs when the stems rot at the point of contact with the potting mix. This occurs when your tubes remain wet on the surface overnight. To avoid this you must water early in the day so the surface mix has a chance to dry out and the seedling stems remain dry. Collar rot will most likely affect most or all of your seedlings. If seedlings are affected, separate them from healthy plants and destroy them – they will not survive. Ensure healthy seedlings are in a sunny and well-ventilated area.

Damping off is due to harmful pathogens in the soil. If there is any sign of the seedling wilting and going rotten, use a fungicide (available at your local gardening shop) and immediately spray all your seedlings, following the directions on the label. This will often present as a small patch of dead or unhealthy seedlings amongst healthy ones. Separate unhealthy seedlings immediately. If it is not treated promptly the fungus can quickly spread, causing the death of all the seedlings. Damping off is easily avoided if the hygiene guidelines are adequately followed.

Established seedlings

Powdery Mildew is a common problem, particularly for eucalypts. It will appear as a whitish or purple powdery substance on the leaves and stems, or brown spots on the leaves. It is generally a cooler-month problem, caused by too much moisture on the plant, particularly overnight.

What causes it?

Watering your seedlings at night, when the temperature is not warm enough for the moisture to evaporate. It also occurs if the seedlings are in too much shade, or if they have not been thinned, preventing air circulation around the individual seedlings.

How do I prevent it?

Keep foliage dry in cool weather at night; ensure your seedlings are in full sun and make sure you thin your seedlings to prevent overcrowding

To treat it, you can buy mildew products at your local garden shop – similar products are designed for roses. Lime Sulphate spray is a common product. Spray directly on to the affected areas, and ensure you follow directions carefully. You can also use a milk solution, mixing 1 part milk to 5 parts water and spray directly on to the affected areas every second day.

Mildew will usually only set back a plant, rather than kill it; however you will need to act quickly, and remove and discard any very badly affected seedlings.

It can be avoided if the plants are in the right position, watered at the right time, thinned out and by being vigilant.

Garden Pests

This includes slugs, snails, caterpillars, cutworms, grasshoppers, birds, aphids. All require immediate treatment. Whatever pests you already have in your garden are likely to turn up on your seedlings.

Not all insects will cause damage to your seedlings; indeed some are beneficial as they prey on others. Good insects include ladybirds, wasps, bees, praying mantis and some other bugs. Check what the bugs are before you do anything.

- Slugs and snails will hide between tubes, so you need to look and remove them. Signs are chew marks and snail trails, and they are a common offender. Dispose of them as your conscience permits and use garlic spray

Never put your boxes on the ground

- Caterpillars come in many varieties with different feeding and living habits. They can appear at any time but their numbers build up from March onwards. Loopers stand up on the stems pretending to be other stems.

Others fold and stick leaves together and shelter there during the day. Some rely on a green background to avoid detection. Others build a large web around the base of Melaleucas and Callistemons. All eat a lot of leaves. Watch your seedlings for signs as well as the insects themselves. Signs include holes in leaves, and top leaves rolled up or joined together. Bare stems and skeletonised leaves are extreme symptoms. Check daily and remove by hand. In severe cases, use 'Dipel' (available at garden centres) or garlic spray

- Cockroaches are sometimes attracted to the humid conditions in boxes of seedlings especially if the boxes rest on an undrained surface. Dirt in the bottom of the boxes encourages them. They won't hurt the seedlings but are unwelcome for other reasons. Good box hygiene will discourage them
- Cutworms. These brownish grubs live in the soil and gnaw off seedlings just above ground level, toppled as if by a miniature forestry worker at night. Look for them by torchlight - they are about 2 to 3 cm's long and brownish in colour. You can sometimes see that the soil mix is tunneled into and you can dig down and find the grub. Cutworms affect the more established seedlings, so do not confuse them with "damping off" which affects the younger, newly germinated seedlings. 'Pyrethrum' watered into the soil kills them, or you can check at night with a torch and collect them – you may see their tunnels into the potting mix. Submerging the tubes in water will cause the cutworm to come out to breath at which time you can remove by hand.
- Crusader bugs suck sap from tops of seedlings and the top of the plant dies. The remains of the plant usually recover and grow bushy.
- Grasshoppers. These are hard to control due to their mobility; raised benches and vigilance are necessary
- Aphids. Small sap-sucking insects which cluster around new shoots. Wash off with the hose or use 'Pyrethrum' or garlic spray
- Birds - may nip off or pull up seedlings. Cover your boxes with firm netting or wire which does not tangle the birds' wings or feet
- Possums. These creatures love the juicy leaves of seedlings. If you have possums in your area, you will need to cover your seedlings with wire mesh - ensure it is sturdy as they can be very persistent
- Mice. Lomandra seed is a favourite menu item for mice. If you are growing Lomandra for your order you will need a fine mesh wire to cover the box until all your seed has germinated. The wire gauge needs to be small enough to stop hungry mice.
- Cats. Out of comfort, cats will often choose a warm box of seedlings to lie in and sun themselves. Wire mesh or netting may help, or skewers stuck in to the tubes (making sure you do not disturb any roots).

Garlic Spray Recipe – The natural Insecticide:

Garlic is effective against a wide range of diseases and insects at different stages in their life cycle (egg, larvae, adult). This includes ants, aphids, army worms, caterpillars, Colorado beetle, diamondback moth, pulse beetle, whitefly, wireworm, false codling moth, imported cabbage worm, khapra beetle, mice, mites, moles, peach borers and termites as well as fungi and bacteria.

Spray Option 1:

Blend 100 grams of grated and crushed garlic cloves, 0.5 litres of water and 10 grams of soap (use castile or potash based soft soap that is used for washing dishes and not the modern washing powders that contain caustic soda which will harm plants). Mix well. Strain the mixture through a fine cloth. Dilute the solution in 5 litres of water.

How to use: mix the solution well before applying to the affected plants. Use as a spray or sprinkle using twigs or grass tied together to form a whisk. For best effect, use the mixture immediately.

Spray Option 2:

- one whole garlic bulb
- two cups water
- one litre water

In a blender combine the garlic bulb, two cups water and blend on high speed until garlic is finely pureed. Put in storage container and set aside for a day. Strain out pulp, and then mix liquid with one litre water in sprayer. Spray tops and bottoms of leaves thoroughly. Apply about once a week, and after a rain.

Trees getting too big?

Inform your Coordinator. If your landholder is not ready for planting, reduce watering and put the trees in the shade to slow growth.

Uneven growth

Different species will naturally grow at different rates, so this is not always a problem. However, if the same species are growing at significantly different rates, it could be due to:

- Uneven distribution of fertiliser through the potting mix. The potting mix we use is a carefully formulated growing medium and, apart from a few trace elements, contains no plant nutrients. You may find that your seedlings vary in size and this is partly due to uneven distribution of the fertiliser in the tubes. You may need to use a water-soluble fertiliser ([Seasol](#)) to even-up the growth and stimulate the slow ones. Dilute Seasol so it is the colour of weak tea

- Uneven watering. Ensure your seedlings are all receiving the same amount of water. If you have an automatic watering system, check that all seedlings receive adequate water, particularly those around the edges
- Direction of boxes. You may find the seedlings at the end of the box that face west are larger than the end facing east. This is because those seedlings are getting the warmer afternoon sun. Ensure that you regularly rotate your boxes during the growing season
- Partial sunlight – Grading. As your seedlings grow, group them by height. Put the smaller ones at one end of the box and turn that end of the box to the direct sun so the tall ones don't shade the small ones. Seedlings with full sunlight will always grow faster than those that are in part or full shade. Check your boxes all get the same amount of sunlight. You may need to move you boxes as the season changes and the sun moves. Never leave your seedlings in full shade, unless they are getting too big.

Notice how the seedlings in the lower/ front of the box are much smaller than the ones at the back. These seedlings are being shaded by the ones facing the sun and their growth is stunted.

If you have any other problems, or have any questions about propagating your seedlings, please contact your area coordinator.



Appendix 3 - Constructing a Simple Watering System

If your time is limited, a simple watering system with or without a timer tap may be worthwhile. It does not need to be elaborate - you can make one out of some old hose, boards and a few misting nozzles.

If you don't have a flash bench, make a frame like this photo from boards.

You can use wire to secure the upright sections to the bench. Secure a length of doweling or other wood across the top.

Insert the misting nozzles into the hose at the recommended spacing, and attach the hose across the top, securing with wire.



Make sure your misters cover your boxes without any dry spots around the edges. Determine how long you need to run your watering system to thoroughly water your seedlings - that is, until the water runs out the bottom of the tubes.

You will need to be observant as the seedlings grow and the weather changes, to ensure you are giving them enough water.

Please note: Where there are water restrictions, ensure you set any automatic timer to within the guidelines set by the local water authority

Ensure you change the setting on your automatic watering timer as the season changes leading into autumn and leading out of winter.

Appendix 4 - Transplanting Instructions

Transplanting

New growers will have attended grower training to learn how to transplant. Transplanting needs to be done carefully as the seedlings can be damaged if done incorrectly. Transplanting can make the roots twist or curl, causing the tree to fall over later in life. Transplanting should only be done if there has been a low germination rate or death of seedlings.

Remember, our objective is one healthy plant per tube, delivered in good condition to the landholder. Generally, the smaller the seedlings are when transplanted, the better.

Watch this 5 minute [video](#) and follow the instructions below

1. Choose a mild day. If it is too hot, you may lose the transplants. Remember to follow the hygiene rules and disinfect any equipment you use

Do not use soil, compost or potting mix from your garden

2. Before starting, thoroughly wet all tubes from which seedlings will be removed
3. Loosen soil in tube by squeezing corners together
4. Remove seedlings from tube. Put seedlings that are to be transplanted into wet newspaper folded over the roots to keep them from stressing while waiting to be transplanted
5. Empty out the tube that you will put the transplanted seedling into
6. Half fill empty tube on the diagonal so that there is a clear path to the bottom of the tube. Lightly pack the soil so that it will stay in place when you turn the tube upright
7. Roots longer than the tube should be trimmed back to fit the tube without curling. It is very important to keep the root straight



8. Make sure the roots are straight downwards in the tube and are not bent or twisted. If the roots are bent will continue to spiral. When the seedling is planted out the root will continue to spiral rather than spread out. Later in life as the tree grows larger it will not have the root mass to sustain the head of the tree and it will fall over

9. Place the seedlings against the side of the hole so that the uppermost roots are a few millimetres under the surface, and gently back fill the tube with soil

10. You can put two seedlings in the tube if you have a lot extra to spare. This way if one seedling does not survive transplanting the other might. You can thin the extra one later

11. Hold the seedling head between your first two fingers to hold the seedling in place while you gently tap the tube so that the soil settles Do not pack the soil with your fingers

12. The soil will settle leaving your seedling sitting with some of the root exposed. Add more soil to each side of the seedling. Gently tap tube (while still holding on to the seedling) settling soil again

13. Consider how you will identify them. If you transplant more than one species, you must tag them so they can be returned to their original boxes

14. Finally, return them to their original box after this recovery period ... but choose a mild day so they are not overcome by heat, wind or rain.

15. Place the (identified) transplants on your raised, shaded sheltered site, for 10 to 14 days

16. Once seedlings are stabilised place into the direct sun to strengthen.



Pricking out

Picking out is a method used to transplant very small seedlings from a tray or tube into another tube. The seedlings are very young with small root systems so they can be 'pricked out' and transferred to another tube. This applies to seedlings at the four leaf stage. It is not a suitable method for seedlings that are taller than 5cm. The most likely scenario for this method is if you need to attend the TreeProject nursery to source extra seedlings.

Tools

Tray with weak solution of Seasol (to minimize transplant shock)

Pricking out tool e.g., chopstick, or something with a point

Method

1. Ensure that the seedlings are well watered
2. Fill empty tube with moist soil
3. Use your pricking out tool to make a small hole in the middle of the soil in the empty tube
4. Gently hold the seedling by the leaves
5. With your pricking out tool gently push down beside the seedling that you intend to transplant
6. Once down beyond the roots lever the seedling out very gently to avoid damaging the roots
7. Dip the roots in the weak Seasol mix. This helps to minimize transplant shock and allows the roots to hang together
8. Still holding onto the leaves lower the roots into the prepared hole and backfill
9. Once you have finished transplanting. Place the (identified) transplants on your raised, shaded, sheltered site, for 10 -14 days. They can then be moved back with the rest of your seedlings.

You will probably have also disturbed the roots of the seedlings in the original tubes. Give these seedlings a weak drink of Seasol and place the box in a shaded, sheltered spot for 4-5 days to allow them to recover from having their growing mates removed and their roots disturbed.

Helpful resources

Australian Native Plants Society (Australia) <http://anpsa.org.au/>

'Getting Started' - is a 32 page publication aimed at the new grower of Australian native plants (although more experienced growers will find some useful information as well!). Find it in the [Downloads](#) section of the Australian Native Plants Society (Australia) website.

