ALEP

Aboriginal Landcare Education Program

8

Undertake Propagation Activities

Learning Guide

Greening Australia

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Student name:.....

Student number:.....

INTRODUCTION

Welcome to *Undertake Propagation Activities*. You might need to be able propagate plants in wholesale or retail nursery work or when doing revegetation or landscaping work. This could be when you are working for your council, doing ranger work or when managing your own country. Training should be completed on the job in a plant nursery over an extended period of time.

This learning guide covers information on how to collect propagation material and propagate plants by the most common methods – by seed, cuttings, division and layering.

EQUIPMENT REQUIRED

To complete this training you will need the following:

1. Appropriate Personal Protective Equipment (PPE).
2. Safety gear including first aid kit and water.
3. A range of seeds, and parent plants to take cuttings from or to divide up.
4. Hand tools such as secateurs, spades, forks, dibble sticks and trowels.
5. Pots and trays, potting mix ingredients, rooting hormone, labels and pencils.

It is recommended you undertake Pot Up Plants *and* Tend Nursery Plants *after finishing* Undertake Propagation Activities.

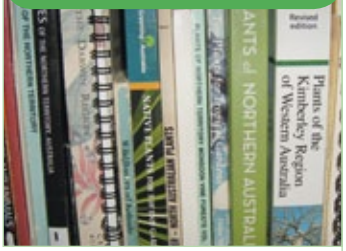
ASSIGNMENTS

There are three assignments you will need to complete.

Some of these assignments may go towards your final assessment.

Section	Assignment	Competent (C) Not yet competent (NYC)	Date Achieved
Getting Prepared	Assignment 1. Project Risk Assessment		
Propagate Plants	Assignment 2. Cuttings		
Finishing Up	Assignment 3. Propagate by Seed		

1 GETTING PREPARED



1A. COLLECTING INFORMATION

Information about propagating plants can be obtained from many sources. There are some excellent books available that will help you (see References on page 25).

There is also information available online.

1. The Nursery and Garden Industry Association has lots of resources including useful publications and a link to the Nursery and Garden Industry Northern Territory.

   www.ngia.com.au

2. Information specific to horticulture in the NT can be found at the Northern Territory Horticultural Association.

   www.ntha.com.au

3. For Australia wide information and resources on plant propagation try the Greening Australia web site.

   www.greeningaustralia.org.au

1B. PROPAGATING PLANTS SAFELY

There are some dangers associated with propagating plants. It is important that you be aware of potential dangers so you can avoid getting injured or sick.

Personal Protective Equipment (PPE) will help protect you from serious injury, but no amount of PPE will protect you from bad workplace actions. Always follow workplace guidelines and your trainer's directions.

Some of the things you can do to keep yourself safe include:

1. Wear thick gardening or rubber gloves.
2. Wear appropriate clothes for outdoors and in wet weather wear waterproof clothing.
3. Wear protective footwear at all times, in some situations you may need rubber boots.
4. Wear a hard hat if collecting seeds and propagation material from trees.
5. Watch out for snakes, spiders, wasps and other insects when collecting propagating material.
4. Keep safe distances away from other workers around hand tools.
5. Learn how to maintain and use hand tools correctly to avoid injury.
6. Always lift heavy objects correctly to avoid injuring your back (see Resource 1 for correct lifting procedures).
5. Know where your first aid kit is stored and make sure someone has a first aid certificate.

RISKS WHEN HANDLING POTTING MIXES

The handling of potting mixes requires special care to protect yourself from getting sick.

Some potting mixes contain a harmful bacteria called Legionella. The bacteria can cause Legionellosis, a type of pneumonia (this is not Legionnaires disease which is caused by a different Legionella bacteria found in air conditioner cooling towers).

To reduce the risk of infection when handling potting mixes follow these recommendations:

1. Handle all mixes with care to avoid breathing in dust.
2. Moisten the mix to avoid creating dust.
3. Wear suitable PPE to avoid contact with skin and eyes – gloves, dust mask, protective eyewear.
4. Avoid transferring the potting mix from hand to mouth – wash your hands before smoking, eating or drinking, even if you wore gloves.
5. Wash work clothes regularly.
6. Clean work area by wet-sweeping or vacuuming.
7. Seal any opened bags or containers after use and store in a cool location.

Legionella bacteria infects the lungs when breathed in. Symptoms of Legionella infection include: fever, dry cough, breathlessness and chest pain. Other things in the potting mix can also cause lung irritation, asthma, hay fever, inflamed nose and throat – even more reason to be careful.

SAFE USE OF CHEMICALS

The use of chemicals (such as fertilisers) when carrying out any propagation work requires some extra special precautions.

Keep all chemicals locked in an appropriate chemical cabinet. Only people with the right training should use chemicals.

The following PPE should be considered when using chemicals.

1. PVC or chemical resistant gloves.
2. Goggles or protective glasses – protect your eyes as they easily absorb chemicals (a full face shield is needed for mixing some concentrated chemicals).
3. Dust mask or respirator – prevents the inhalation of dangerous chemicals.
4. Cotton hat – protects the head from chemicals and can be washed clean after each use.
5. Rubber boots – prevents spray getting onto your feet – the overalls should cover the outside of the boots so drips don't run down the inside of the boot.
6. Cotton overalls – suitable for general chemical work and will protect work clothes underneath – wash after each use or use disposable overalls.
8. PVC apron – used to protect clothing when mixing concentrated chemicals (a PVC suit may be necessary for some dangerous chemicals).

Before you begin, use this checklist to confirm you have followed good safety procedures and have all the right resources.

SAFETY CHECKLIST ACTIVITY		✓
Long trousers, shirt and boots		
Hat and gloves		
Sunscreen, insect repellant and sunglasses		
Dust mask		
Additional PPE as needed		
Water		
First aid kit		

1C. WHY PROPAGATE PLANTS

You might want to propagate native plants (rather than buy in plants from a nursery) for many reasons including:

- Flora and fauna conservation.
- Genetic conservation and the maintenance of local provenance.
- Local varieties may grow better in local conditions.
- Cost.
- To preserve the local character of an area.
- Education.
- Pleasure.

1D. TOOLS AND SUPPLIES

Using the correct tools will make propagation easier and will help to keep you free from injury.

Tick off the items you think you will need for your propagation activity.

		ACTIVITY ✓
Buckets		
Bleach		
Methylated spirits		
Broom		
Secateurs		
Knife		
Trays, pots, tubes, and containers		
Potting mix		
Wheelbarrow		
Shovel and Spade		

Trowel		
Dibble stick (can use an ice cream stick, plant label or a shallow spoon)		
Rooting hormone		
Watering can		
Hoses		
Forks		
Fertiliser		
Plant labels		
Pencils		
Rubbish bins		

1E. HYGIENE

Losing seedlings to disease can be very disappointing, especially as it takes a lot of time and energy to grow good plants. Nursery diseases, such as fungus, viruses and bacteria can spread quickly through a nursery killing plants.

Maintaining good hygiene standards will help stop the spread of disease or weeds. Diseases are spread on any surface, via wind, in water, in potting mixes, on plant material or on boots and clothing of workers or visitors.

KEEP YOURSELF CLEAN

- Keep your boots and clothes clean when working in a nursery.
- Wash your hands regularly with an antiseptic soap.

POTS AND EQUIPMENT

Pots, trays, labels and equipment such as trowels, dibble sticks, wheelbarrows and spades can introduce disease problems if they are re-used without thoroughly cleaning to sterilise them first.

- Scrub off any soil first.
- Soak pots and trays in a bleach solution (10 ml bleach per litre of water) for 20 minutes.
- Make sure you rinse thoroughly with clean water to remove all the bleach.
- Equipment should be washed in the bleach solution and then rinsed.
- All bench surfaces will need to be wiped with the bleach solution before you start work.

SECATEURS AND KNIVES FOR CUTTINGS

- Secatuers and knives should be sterilised in methylated spirits.
- Resterilise them often to stop disease spreading from sick to healthy plants.

PATHS AND FLOORS

- Paths and floors should be kept clean and free from algae to reduce disease and stop people slipping over.
- Scrub all pathways with bleach and a stiff broom.

ACTIVITY

With your trainer walk around your nursery area and identify any areas of bad hygiene. At each site make some recommendations on how hygiene could be improved.

Area of poor hygiene	Improvements recommended
e.g. water pooling on pathways	

1F. COLLECTING PROPAGATION MATERIAL

PERMITS AND PERMISSION

Before collecting any seed or cuttings you will need to get permission from the landowner and you may need a permit from the government. Make sure you do not collect from any threatened species. The learning guide for *Collect, Treat and Store Seed* has more information and should be read before collecting seed or cuttings.

COLLECT SEEDS

If you are collecting seeds you should work through the learning guide for *Collect, Treat and Store Seed.* This will teach you everything you need to know about collecting seeds.

It is also possible to buy seeds from a seed supplier.

COLLECT CUTTINGS

Cuttings produce new plants identical to the parent plant. Not all plants can be grown from cuttings and it is not recommended that large trees be grown from cuttings.

Low growing shrubs and groundcovers that are generally short-lived are well suited to cuttings e.g. Beach Vitex (*Vitex rotundifolia)* and Beach Morning Glory (*Ipomoea pes-caprae*), as they root readily at the nodes.

When

- All cuttings should be collected early in the day before the sun is hot and preferably used as soon as possible soon after.

Taking cuttings

- Make sure your secateurs or knife are sharp and clean.
- Take cuttings from healthy, disease-free plants, preferably from the upper part of the plant.
- Cuttings should generally be taken from current or past season's growth.
- The end of the stem is best, but a long shoot can be divided into several cuttings.
- Cut just below a node.
- Cuttings are generally 8 to 12 cm long.
- Avoid material with flower buds if possible.

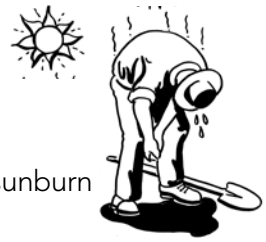
Storage

- Remove the leaves from the bottom half of the cutting.
- Cut remaining leaves in half to reduce water loss.
- Cuttings should be placed in water or wrapped in wet newspaper in a plastic bag.
- If necessary, they can be stored in a cool place such as an esky or fridge for a number of days.

ASSIGNMENT 1 A1

PROJECT RISK ASSESSMENT

- Stop and think before starting work.
- What needs to be done so you can work safely?
- Complete the **What to do about it?** column – we have written one thing in each box – try and think of some others.
- Fill in all of the last row by adding a new hazard.

HAZARD **and what can happen = the risk**	**What to do about it?**
SUN EXPOSURE Risk of: Heat exhaustion, deyhydration and sunburn 	• Wear protective clothing • • •
WORKING WITH SOIL Risk of: Soil borne diseases 	• Wet potting mix before use • • •
TRIP HAZARDS Risk of: Injury from falling over 	• Clear walk way of any hazards – boxes, tools etc. • • •
WET SLIPPERY AREAS Risk of: Injury from slipping over 	• Walk slowly • • •
USE OF CHEMICALS Risk of: Poisoning 	• Read label and understand what the chemical is used for • • •
	• • • •

2A. POTTING MIXES

A good potting mix should be able to hold moisture for plants to grow but should not be too wet or soggy (or the seedlings will rot). If you pick up a handful of mix and squeeze it and water oozes out then it is too wet.

Other things to remember are:

- Potting mixes should be sterile, free from weeds and soil diseases. Some nurseries have facilities to sterilise their mixes (using steam or chemicals), sand can be sterilised in an oven or microwave, otherwise purchase sterile ingredients.
- Never reuse old mixes or used garden soil. The use of new materials will reduce the chances of disease attacking seedlings.
- Always wash all containers, tools and benches with diluted bleach and water (10 ml bleach per litre of water).

There are lots of different recipes, talk to your trainer about:

- What is best for your plants.
- What materials you can get locally and can afford.
- What type of environment the potted plants are going to be growing in (sun, wind etc).
- What your watering system is.

Here is a basic recipe for your potting mix based on one part peat to one part sand. It is based on materials you may be able to find in a remote area. You can use local river sand, and compost instead of peat if needed. Make sure you mix the ingredients up thoroughly using a shovel.

Peat (1) 

Sand (1) 

For more recipes and information about potting mixes and their ingredients see Resource 2.

Commercial potting mixes and from garden centres can also be used. Talk to your trainer about what mix is best for your needs.

2B. PROPAGATION – SEEDS

Using seeds is the most common method of propagating plants.

SEED TREATMENT

Many species germinate easily when placed in a moist, warm environment. However, some seeds need special treatments before they are sown. These treatments copy natural processes seeds would undergo in the bush e.g. fire, digestion by birds and animals, long periods in the sun and weathering or alternate periods of rain and sun.

Talk to your trainer about treatments needed for your seeds.

Hot water: As a general rule, seeds with hard, shiny coats require hot water treatment to break dormancy and to allow water to enter the seed coat (e.g. Wattle or *Acacia* seeds).

- Place seeds in a dish and pour hot water (freshly boiled, not boiling) over them.
- Leave overnight to soak
- Most of the seeds will swell slightly and sink to the bottom.
- Seeds that float are dead and should be discarded.

Cold Water: Same treatment as for hot water but use cold water. Grevillea seeds generally need cold water treatment.

Scarification: Scratching with sandpaper, nicking with a knife or secateurs, or filing the seed coat.

Storage: Seeds such as some native grass species require time for the embryo to mature and may require a period of storage in cool dry conditions for 3–12 months.

Smoking: Species that have evolved with fire may require exposure to smoke, smoke-water or fire.

Fermentation: Fleshy fruits are soaked in water or stored in a plastic bag with a little water for 2–3 weeks. The flesh is broken down by the fermentation process leaving just the seed ready for germination.

Removal of flesh: The flesh is removed by hand to leave the seed only. Firm flesh can be removed by soaking the fruit in warm water. The flesh can normally be gently pulled off or the fruit can be pushed through a sieve with running water to remove the flesh. The seeds should be dried before sowing.

Passing through animals: Seeds of some species need to pass through the gut of an animal before they will germinate. Seeds can be collected from droppings, dried, then spread over the surface of the propagating mix.

SOWING SEEDS

Germination trays: Sowing seeds into germination trays is a method still widely used in many nurseries and is more suited to the propagation of larger numbers of particular species.

- Place potting mix into the tray, filling to just below the top.
- Gently bump the tray on a bench to settle.
- Sprinkle the seeds evenly over the surface and cover with a fine layer of mix to a depth equal to their thickness.
- Very fine native seed should only be sprinkled sparingly over the surface of the seed mix.
- Avoid sowing seeds too densely as this may produce weak, spindly seedlings.
- Keep the soil moist, never waterlogged.
- Place the tray in a position that receives filtered sunlight.
- Keep the tray off the ground to allow good drainage and increase the airflow around the seedlings.
- Keep a watch on overhead irrigation or rain as large droplets can easily cause severe blowouts in the sowing mix (and in some cases damage to the seedlings).
- Remove the weaker seedlings to thin out if too many seeds germinate.

Containers/tubes: For growing small numbers of plants and for bigger seeds, seeds can be germinated by planting directly into pots, tubes or other containers. Later excess seedlings can be thinned out with scissors to leave one healthy seedling per container. This avoids the problems associated with 'pricking out' which can result in seedlings with 'J' roots or twisted roots which is a common cause of premature deaths of more wind prone plants.

NOTE

Sometimes you will need to protect your seeds from pests like rats that like eating seeds.

PRICKING OUT

Once the seedlings are about 10 to 20mm tall they are ready to be pricked out (also look for roots coming out of the bottom of the container). This may take anything from a few days, to a few weeks, even months, depending on the species.

- Ensure the seedlings are well watered in the germination tray before pricking out.
- Fill the new pot with moist potting mix to 1 cm below the top, making a hole in the centre for the seedling with a dibble stick.
- Holding the seedling gently between the thumb and forefinger, slide the dibble stick down to the bottom of the tray and carefully lift out the seedling keeping roots intact (if roots are damaged the plant may die).
- Lower the seedling into the prepared hole making sure the roots are hanging straight down and not bent or curled up as this may lead to unhealthy plants with poor root growth.
- Fill the soil in around the roots and up to the level it was in the tray.
- Firm the soil around the plant gently with finger tips to support the seedling.
- Water the seedlings immediately.
- Keep in filtered sunlight for a few weeks, then gradually increase the sun exposure until it has full sun tolerance.

2C. PROPAGATION – CUTTINGS

To plant cuttings follow this procedure:

- Cuttings can be soaked in a weak bleach solution (2ml per litre) for one minute only before planting, to reduce disease.
- Fill the pot, tube or tray with potting mix and make holes in it about 2cm apart using a dibble stick – the depth is one third, to one half of the cutting length.
- Treat the freshly cut base of the cutting with a rooting hormone as per manufacturer's instructions.
- Gently place the cuttings in the holes the right way up - do not push the cuttings into the mix as they may break and also rub off the rooting hormone.
- Stem material can also be laid horizontally over the top of or half buried in the mix - roots will form from the nodes.
- Firm the mix around the cuttings and water in well.
- Keep moist but not saturated and place in a humid warm place in filtered light (light spraying or misting a few times a day will help keep humidity up).
- Cuttings should root within 4 to 10 weeks depending on the species.
- Transplant to individual containers once roots are seen emerging from the base of the container.

NOTE

Hardwood cuttings can be used but are generally planted leafless.

2D. PROPAGATION – DIVISION

Division is the splitting of plants by their roots or bulbs into new plants. Some plants (eg. some grasses) will 'mat' or 'clump' and grow larger year by year. Over time these clumps may start looking messy, especially if the centre of the clump starts to die out. Plants in such clumps may need 'renewing' by dividing up the plant into smaller sections. Division is also an easy way to get new plants from one single clump.

WHEN TO DIVIDE?

The best time of year to divide plants depends upon each plant but generally when they are healthy looking and growing quickly. Just as the plant begins 'reflushing' at the beginning of the wet is a good time to divide.

Divide your plants when it is cool and humid (not in the hot middle part of the day). A rainy overcast day is ideal. Do not leave the root ball exposed to the sun for too long. Strong winds and sun will damage the newly exposed roots. If the sun is strong cover the plants with temporary shade.

STEP BY STEP DIVISION

1. Water the plant well and make sure all the soil around the roots is damp. It's best to water the plant the night before so it gets a good soak, but is not waterlogged when you go to dig it up. Digging up the plant is traumatic and watering well will help reduce this shock.

2. Decide if you want to divide the plant by either: leaving the original plant in the ground and removing sections to replant; or by lifting the whole plant out and splitting into sections. If you remove sections then leave 1/3 of the original plant in the ground untouched.

3. Dig a trench around the plant at the drip line of the leaves. Use a sharp spade to severe the roots with a clean cut. Make sure you dig down deep enough to get under the majority of the root ball. Try and keep as much soil around the roots as possible.

3. Lift out the whole plant in one go (if the clump is too big and heavy you may have to lever it out with a shovel). Place the clump on the ground alongside the hole. Remember large clumps and wet soil can be very heavy – protect your back by lifting properly or seek assistance from someone else.

4. Trim back the leaves and dead parts by a third. This will stop the plant losing too much water and becoming too stressed. It might look harsh but the plants will recover very quickly.

5. Divide the clump by pulling apart with your hands, or splitting through with a sharp spade, axe, saw or very sharp knife. Each new section should have some nice healthy roots and a new growing point or shoot. For fleshy rooted plants you might be able to prise the sections apart by using two forks. Cross the forks deep in the

centre of the clump so the backs of the forks are touching. Pull the fork handles in opposite directions and the sections should spilt easily apart. If the clump is very large you can repeat the division a few times until you get the size sections you want.

6. When replanting the divided plants into the ground, replace some of the old soil with enriched composted or well broken down organic mater. This will help the plants get off to a good start. Water in well.

7. If potting on into containers for later use, always use a good quality potting mix with trace elements added, not the original soil. Press the potting soil down well around the roots and water well.

2E. PROPAGATION – LAYERING

GROUND LAYERING

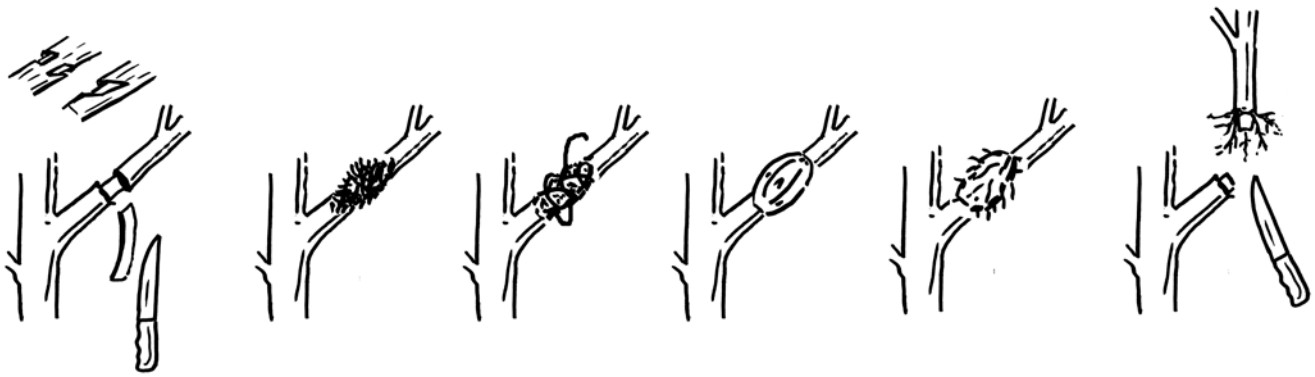
Sections of stem are partially cut while they are still growing on the plant and pinned into the ground. Use a rooting hormone on the cut area. When new roots shoot from the injured stem the whole section can be cut from the parent plant.

ACTIVITY

With your team practice dividing up some plants.

AIR LAYERING

A section of about 30 cm of branch is selected whilst still on the parent plant. The stem is cut or a section of bark is removed from the stem. Use a rooting hormone on the cut area. Cover the cut with moist peat moss or coco peat and wrap with foil or plastic to keep moist. Once new roots show through the plastic the whole section can be cut from the parent plant. This method is also known as marcotting.



2F. PLANT LABELS

Labeling all plants you have propagated is essential. Labels are normally inserted in the side of the pot or tray. The minimum information to put on a label includes:

- the name of the plant
- the date propagated

Other label information might include batch number, seed treatment or the propagator's name.

White plastic rectangular labels are commonly used. Use pencil or chinograph pencil as these tend not to fade in the sun and don't readily wash off. Make sure the label stays with the plant if it is transplanted into a bigger pot.

In a big nursery labels may be ordered in already printed.

2G. WATERING AND FERTILISING

WATERING

Water plants with a fine spray once or twice a day, ensuring the mix stays moist, not waterlogged. The plants should stay in filtered sun for a few weeks, then gradually increase the sun exposure until it has full sun tolerance.

It is very important to water your plants immediately after they have been planted into their pot. Then they need to be watered regularly.

FERTILISING

Seed mixes do not need fertiliser as seeds have their own in built fertiliser.

For plants that have been pricked out you can apply a slow release fertiliser regularly to the plants in their pots (or add the slow release fertiliser to the potting mix). Alternatively fertilise weekly with liquid seaweed based fertiliser.

Don't use too much fertiliser on young plants and keep it away from the stem of the plant.

ASSIGNMENT 2 A2

CUTTINGS

Working with your team, prepare cuttings from a range of plants. Fill in this table for all plants

Botanical name	Local name	Container size	Number of cuttings	Rooting hormone used	Date
Vitex rotundifolia	Beach Vitex				

3 FINISHING UP

3A. RECORD KEEPING

Most nurseries will have records about propagation that need to be filled in. These may be in a book kept in the potting area. Make sure you fill in any records as soon as you have finished propagation.

3B. CLEANING UP

It is important for many reasons that all working areas are kept clean and tidy. Messy and dirty work areas are not only a safety hazard they can also help spread plant diseases.

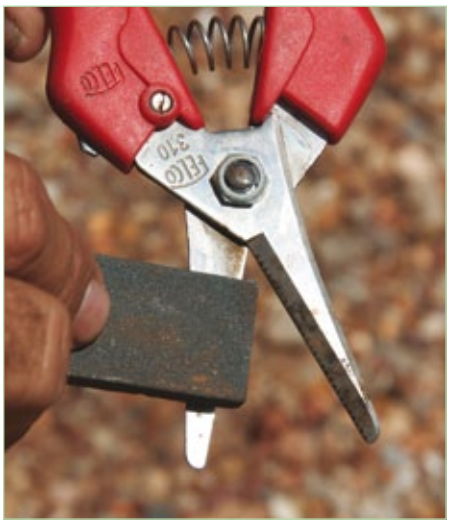
Clean and store away all tools used. All benches should be cleared and wiped down with a disinfectant such as diluted bleach (10 ml bleach per litre of water). All floors should be swept to remove all plant material and left over potting mix as these can also be a safety hazard. Wash or hose off the floors. All pathways need to be kept clear.

In any nursery situation it will be very important to keep cross contamination of plant material to a minimum (ie. we don't want to mix diseased soil or plant material with fresh mixes).

3C. TOOL MAINTENANCE

To make the next job easy and to prevent personal injury it is very important to keep tools in good condition. Follow the steps below:

- Wash all tools of mud and dirt and oil any metal parts to prevent rusting. Steel wool and a light oil will remove any surface rust.
- Keep tools sharp and in good working order. Bevel the back edge of a spade off with a bench grinder or a coarse sharpening stone.
- Replace any broken handles. Never use bush sticks as handles as they often break causing injury.
- Sand and oil all wooden handles to avoid getting nasty splinters. Use 50% mineral turpentine and 50% raw linseed oil on wood.



3D. DISPOSAL OF WASTE MATERIAL

After potting plants there is often a range of unwanted waste material left behind that needs to be dealt with. Things such as pots/tubes, unwanted cutting material, soil, fertiliser, bags, tags and plant debris. It is best practice when finished to leave a completely clean working area free of rubbish.

Methods of waste disposal could include:

- Organic waste: mulch and composting is suitable for plant debris. For cardboard and paper recycle.
- Inorganic waste: plastic/metal/paper based materials may be recycled, reused or returned to manufacturer - for inorganic material that cannot be recycled it is best to take them to an authorised landfill (do not burn old containers as the gases given off are toxic).

Always clean up and dispose of, or recycle, your old pots.

ACTIVITY

List methods for dealing with the following waste material on your worksite:

Waste	Disposal/recycling method
Plant parts	
Cardboard and paper	
Used soil	
Plastic pots/trays etc.	
Plastic bags/wrapping	
Used chemical containers	
Old cutting material	

ASSIGNMENT 3 A3

PROPAGATE BY SEED

With your team sow a range of seeds following the instructions outlined in section 2B.

Record all your activities here and make appropriate labels for all containers.

Botanical name	Local name	Container size	Seed treatment	Date
Acacia auriculiformis	Black wattle			

RESOURCES AND REFERENCES

RESOURCE 1: BASICS OF GOOD LIFTING

Correct handling of materials is important to ensure a safe working environment. Improper lifting techniques can lead to back pain and learning the right way to lift will help you avoid this.

1. **Plan ahead**
   - Size up the object and test to see if it is possible to lift by yourself
   - Clear a path and make sure there are no obstacles in your way
   - Practice the lifting motion before you lift the object

2. **Lifting the object**
   - Place your feet shoulder width apart with your feet close to the object
   - Keep the object close to your body
   - Bend your knees and tighten your stomach muscles
   - Get a firm hold on the object and stand up slowly keeping your back straight
   - Let your legs do the lifting work
   - Take short steps and do not twist

3. **Putting the object down**
   - Keep the object close to your body
   - Bend your knees and keep your back straight
   - Let your legs do the work
   - Wait until it is firmly in place before letting go

RESOURCE 2: POTTING MIXES

A good potting mix should be able to hold moisture for plants to grow but should not be too wet or soggy (or the seedlings will rot). If you pick up a handful of mix and squeeze it and water oozes out then it is too wet.

Other things to remember are:

- Potting mixes should be sterile, free from weeds and soil diseases. Some nurseries have facilities to sterilise their mixes (using steam or chemicals), sand can be sterilised in an oven or microwave, otherwise purchase sterile ingredients.
- Never reuse old mixes or used garden soil. The use of new materials will reduce the chances of disease attacking seedlings.
- Always wash all containers, tools and benches with diluted bleach and water (10 ml bleach per litre of water).

NOTE

Commercial potting and seed raising mixes from garden centres can also be used instead of making your own.

INGREDIENTS

Peat

The peat holds moisture so the mix will not be too dry. It also helps hold nutrients. The mix must not have any large peat clumps as this may cause seeds to rot, it should be well sieved or broken up finely before using. Some peat needs to soak in a bucket of water before using.

Many people prefer to use coco peat instead of the more traditional peat moss (peat moss is the decomposed remains of vegetation from a bog or swamp). Coco peat is the coarse fiber from the outer shell of a coconut. It is considered more environmentally sustainable and supports regional industry development in Asia and the Pacific. Coco peat is also known as coir fibre. You should buy good quality coco peat, if it is not already washed, you should wash it before use to remove salts (spread out and 3 hours under a sprinkler).

You may be able to use compost instead if you have no access to peat.

Sand

Sand increases pot weight which helps prevent plants blowing over in the wind. The sand also improves drainage so the mix will not be too wet. It is best to use coarse washed river sand. The sand should be thoroughly washed to remove fine soil particles.

Pine bark

Pine bark provides good drainage, increases air in the mix and adds organic matter. 3–6 mm composted pine bark is a good size for the pine bark chips. Additional nitrogen may be needed as the bark can take nutrients out of the soil as it decomposes.

Vermiculite

Vermiculite holds large quantities of air, water and nutrients needed for plant growth. It is a sterile, lightweight mica product. You should always wear a dust mask and goggles when handling vermiculite.

RECIPES

Here are some recipes for making your potting mix. There are lots of different recipes, talk to your trainer about:

- What is best for your plants.
- What materials you can get locally and can afford.
- What type of environment the potted plants are going to be growing in (sun, wind etc).
- What your watering system is.

Make sure you mix the ingredients up thoroughly using a shovel or a cement mixer.

INGREDIENTS

Basic Mix A

Peat (1)

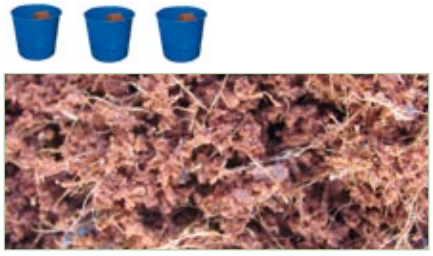
Sand (1)

NOTE

Be careful when measuring out, sometimes you need more shovels of the heavier ingredients to get the same amount as the lighter ingredients.

Basic Mix B

Peat (3)

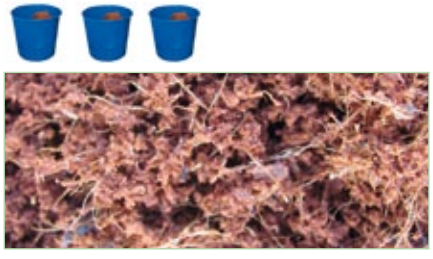


Sand (1)

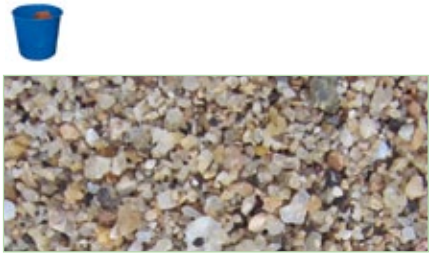
Pine Bark (6)

Basic Mix C

Peat (3)



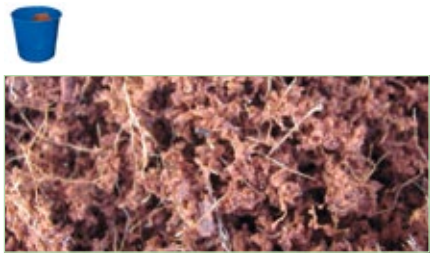
Sand (1)



Pine Bark (1)

Special Seed Raising Mix

Peat (1)



Vermiculite (3)

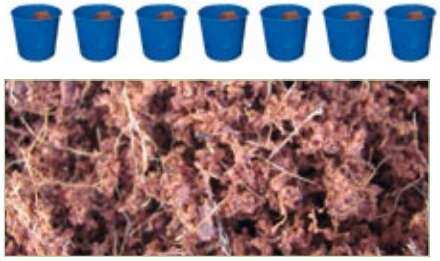
Special Cutting Mix 1

Sieved peat moss (1)

Vermiculite (3)

Special Cutting Mix 2

Peat (7)



Sand (4)

Vermiculite (3)

NOTE

You can just use one of the basic mixes to start off. You can look into the special mixes for cuttings and seeds when you get more experienced. Make sure the mix is well sieved so there are no big particles. For cutting mixes you should try and use a good quality Canadian or New Zealand peat. Or buy a ready made mix from your garden centre.

NOTE

You might need to adjust some ingredients in your potting mixes depending on your area. For example in Katherine there is lots of lime in the landscape which means the water has a high pH. A high pH makes it hard for plants to get nutrients out of the soil. By making the potting mix more acidic (lower pH) it means when the water adds large amounts of lime to the mix, the pH will go back to neutral.

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