



Preparing and Planting your Revegetation Site

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Introduction

This information sheet is designed to assist the planning and implementation of your revegetation project. It explains the necessary steps of preparing and planting out your site. This includes ground preparation, weed control, planting tips and follow up care.

It is essential that your site is well prepared and maintained, as it will minimise seedlings losses and encourage healthy and vibrant plant growth. Poor site preparation and follow up management usually results in high seedling losses, wasting the time and effort involved in propagating and planting your seedlings.

The following information should be used as a guide only. It is strongly recommended that local advice be obtained from your local landcare group, DSE staff or other local environmental professionals.

Preparing the ground

Deep ripping

Deep ripping soil helps root development as it improves aeration and infiltration of rain water. This allows deeper penetration and faster growth of plant roots.

Ripping can be done with a bulldozer or three point linkage rippers on a tractor. On slopes, rip along contours to reduce erosion risk. On flatter sites, cross ripping on a grid layout will guard against windthrow (trees blowing over), which is caused by roots growing in one direction along a single rip line. Avoid bringing any clay subsoil to the surface.

Rip the planting lines to a depth of 40-60 cm or more if possible. Double ripping with rips 50-100 cm apart is very beneficial as it shatters the soil. The space between the rip lines will depend on your planting requirements. See below in the 'spacing' section for more information.

Ripping should be done in fairly dry conditions to optimise the shattering effect. Usually ripping before the autumn break is difficult with commonly available equipment, so ripping after the first autumn rains is the standard practice.

There is probably little advantage in ripping deep sands, as water will readily penetrate to the roots of the seedlings. Deep cracking clay sites are not highly suitable either as they will crack along the rip lines in summer, exposing the plant roots to the drying air and pests.

In sites with heavy soils and for ripping undertaken for autumn plantings, firm after ripping by rolling the lines with a tractor. This will minimise disturbance to the soil and reduce the amount of weed seed able to enter the ripline. It will also reduce exposure of the young tree roots.

Trees should be planted between the rips. Where a single rip line is used trees should be planted on the shoulder of the ripline. Trees planted in the bottom of the ripline can get waterlogged in winter.

Fencing

Trees and shrubs must be protected from stock for at least the first three years, or they will be quickly eaten. This may be through fencing, or the use of large and strong tree guards.

Shelterbelts have to be fenced if they are to persist and give good shelter at all heights. This preserves the leaf litter at ground level and protects low leafy shoots. Generally, a shelterbelt fence requires a higher standard of construction to resist greater stock pressure as a result of the extra grass growth. All fencing should be completed before planting time.

Controlling weeds

Poor weed control accounts for most tree-planting failures, due to their competition for light, moisture and nutrients. Weeds can reduce a plants early growth rates by up to 70% compared to weed free sites, and can decrease survival from an expected 90% of trees planted to as little as 10% survival rate.

It is therefore vital that some form of weed control is undertaken. Eliminate weeds early before they use up stored water. The following describes some of the more widely used forms of weed control.

Cultivation

Cultivation for weed control is more successful in lighter, well drained and friable soils. It increases water infiltration and stimulates germination of the soil's weed seed bank by exposing the seeds to light and water. This technique can exhaust much of the soil stored seed before the plantings begin. It is effective when using pre-planting herbicide when undertaken in the season before planting.

In heavier soils cultivation for weed control can be expensive and may allow other weeds to invade. It may also result in windthrow during wet periods in the next year due to decreased soil structure and rainfall infiltration.

Mouldboarding (mounding)

Mouldboarding can give effective weed control by simply burying weed seed and is a simple method for forming mounds on wet or saline areas. Plough back along the rip line from the other side to throw up the soil to form a raised bed. Do this in autumn to let the soil settle before planting.

By planting on mounds in wet or saline sites some of the trees roots are removed from the adverse soil conditions, instead growing in the mounded earth. This can substantially improve tree establishment and growth.

In waterlogged areas the riplines can be made on a slight fall to assist in drainage of the area to be planted.

Weed mats

Weed mats are an effective way of suppressing weed growth, particularly in areas where herbicides are undesired or inappropriate. They also have the advantage as acting as a mulch, improving moisture content in the soil. However it can be expensive when revegetating a large area.

Weed mats are usually made out of jute, recycled cotton, paper or other biodegradable materials. Mats break down at varying rates depending on the thickness and grade of the materials. They can be purchased long rolls for a line of plantings, or small squares for individual seedlings.

Alternative materials are being developed for their effectiveness and cost efficiency. For example, cardboard pizza trays can now be purchased for individual trees, making their use easy and affordable.

Larger weed mats can be laid out prior to plantings, or smaller mats put in place at the time of planting. Seedlings are planted through the mats, which can now be purchased with pre-cut holes, making planting easier.

Chemical control - before planting

Use herbicides only in accord with the manufacturer's recommendations. Handle any chemicals safely at all times. Always thoroughly read the label of the chemical being used.

In many cases it is more environmentally sensitive to us non-chemical weed control. This is particularly the case when planting near water courses or other sensitive environments. Prolonged use of chemicals can lead to resistance.

If using chemical weed control, apply a knockdown herbicide well before planting when the pasture is actively growing. Apply residual herbicides just before planting. It may be used in conjunction with a knockdown herbicide if weeds have emerged since the first spray.

When using residual herbicides (such as simazine or atrazine) it is important to remember that when you are planting your seedlings that their roots should do come into contact with the residual affected ground,

as it may damage or kill the seedlings. This can be avoided by using a tree planter or by scalping the soil. Be particularly careful with high rates of the triazines (eg. simazine and atrazine) because leaching can occur on sandy soils.

Apply herbicide in spots 1.2 - 1.5 metres in diameter for individual planting spots, or 1.5 metre wide strips. Knapsack sprayers can be used for spot spraying. Knapsack sprayers or micro applicators can be used for strip spraying.

Chemical control - after planting

The area within one metre of the tree must be kept weed-free for at least the first year to maximise survival and growth. Good pre-planting weed control minimises the need for post planting spraying. Some chemicals can be applied as an overspray or as a directed or shielded spray in the following autumn.

Where grasses are dominant the trees may be over-sprayed with a selective herbicide which does not damage broadleaved plants. Both grasses and broadleaved weeds can be controlled by using a shielded or directed spray of a knockdown herbicide. See manufactures recommendations on the label. An upturned bucket can be used to protect the tree.

Selecting plants

TreeProject always recommends selecting locally indigenous seedlings for your revegetation project. These species will be the most suited to the local conditions and climate, and attract the local fauna. Where possible, it is also advantageous to use seedlings propagated from locally collected seed. This ensures that not only the seedlings will be suited to your local area, but you will be putting back the right genetic stock. Where sites have been substantially modified, particularly where salinity is a problem, other non-local species may be more tolerant.

In order to access the suitable local species, it is wise to begin planning your revegetation project atleast a year in advance. This gives time to source the local seed and have the right seedlings grown for your property. TreeProject is a low cost way of having your seedlings from your seed. Seedlings can be grown in tubes or cell trays.

Young trees and tubestock generally have a well established root system compared to their stem. Tubestock with very long stem growth as this indicates that the plant may be root-bound. Good quality seedlings in tubes often seem relatively small – up to about 30cm is ideal.

Seedlings that are mildly root-bound should have their roots cut along each "face" of the soil ball or gently teased out and the longer roots trimmed. Very root bound trees should be rejected and better stock found.

Fertilising

In most situations, fertiliser is not necessary and can be expensive. However, less fertile or highly eroded sites may benefit, increasing growth in the first few months. Use only slow release fertilisers that are designed for native, for example, the NPK pill.

Avoid concentrated fertilisers such as superphosphate and animal manure as the high nutrient level can burn the seedlings. Do not use phosphorous fertilisers near Banksias or Dryandra species. In a new area apply it to only some plants to see if it improves growth.

It is essential to ensure good weed control if you fertilise. Failure to do this will mean greatly increased competition from weeds. In all cases, fertiliser should not come in direct contact with the tree stem.

Gypsum may improve the structure of heavy, dispersive clay soils which set hard when dry. Application rates of 500 gams per square metre are frequently used. Gypsum may be broadcast or applied manually.

Spacing

Recommendations spacing between seedlings for particular areas will vary, but generally for shelterbelts, trees within each row and the rows themselves can be spaced 3 to 5 metres apart. Smaller trees and shrubs can be spaced 2 to 3 metres apart. These can include wattles and she-oaks which as fast growing nitrogen-producers, help longer-lived species such as eucalypts.

Tree growers in drier regions tend to plant with at least a 6 metre spacing. Where conditions are harsh, a denser planting with the expectation of some losses may be appropriate.

If you are unsure about plant spacings for a particular purpose or area, seek advice from your local DSE/DPI office, landcare groups or other local contact.

Planting

Timing

In Victoria, for areas south of the Divide, planting in spring allows good prior weed control, avoids most frosts and cold or waterlogged soil. In areas north of the Divide with less reliable spring rains, earlier planting in autumn or winter are recommended. This takes advantage of the winter rains. Consult your local DSE office for advice if unsure.

Planting Techniques

On very sticky clays, a mattock is a good planting tool. Dig a hole slightly larger than the tubestock, remove the seedlings from the tubes, being careful not to damage the tap root, and place in the hole, so that the base of the seedlings is just below the surface. Place the soil back around the hole and firm down.

On prepared loamy soils, there are various tree planters that can be used for planting tubes stock. Most will remove a core of soil the same shape but one centimetre deeper than the seedling pot. This method has the great advantage of allowing the seedling roots to be placed beneath any surface layer of residual herbicide. Plant as above. The most common planter is the Hamilton Planter.

For cell tray stock, the "Pottipuki" planter can be used. This makes a hole for the plant, and has a chute that the seedlings can be dropped into, going straight into the hole. This requires less bending over, saving time and your back!

On average, two fit and experienced people can plant up to 500 seedlings per full day using this method. However, where volunteers, school children or inexperience people are involved, we would suggest having at least six people to plant 500 seedlings over one full day.

In recent years there have been mechanical, tractor drawn planters developed for cell tray stock, mostly modified from vegetable planters. These not only dig a hole for each seedling, but plant it and firm the soil around it. This method required a driver and someone to feed seedlings through the planter, and can plant

several thousand seedlings per day. Mechanical planters are not yet widely available, but can be hired through Greening Australia Victoria.

Post-hole diggers can be used for tree planting, but are not recommended. They tend to form holes with smooth, glazed sides that will not allow root penetration into the surrounding earth, causing the seedlings to die from lack of water and nutrients. If post hole diggers are used as a last resort, ensure that the sides to be broken up (with a crowbar or shovel) in anything but a light sandy soil.

Seedlings should be given a good soaking in their pots the day before planting. For tubestock, tap the seedlings from the pot. Squeezing the diagonal corners of the tube may help with the more difficult ones. For cell tray stock, pop the seedlings out of the tray from beneath.

For plants with normal root systems, simply remove the container with minimal root disturbance and slip the seedling into the hole and lightly firm in by treading. If a seedling is root bound, the roots may need to be teased out before planting.

Watering

It is vital to water at planting time, even if the soil is moist. One litre of water (or more) poured slowly around the planted seedling helps overcome transplanting shock and removes air pockets.

Where annual rainfall exceeds 450 mm, no further watering should be needed or given, provided the site has been ripped, weed control is good and the appropriate species have been planted at the right time. However, it is always wise to check the seedlings at regular intervals over the months following planting to ensure that the seedlings are surviving.

In drier areas, or when the following summer is hot and dry, seedlings may benefit from one or more waterings over summer. A litre per seedlings should be sufficient. However, watering should be limited to once a month at most, so as not to weaken the seedlings.

Mulching

A thick mulch of old straw, rice hulls, gravel, carpet, newspapers, grass or leaf mould, reusable plastic sheets or pre-cut squares of weed-mat placed around the young plants helps conserve moisture and suppress weed growth. Ensure to keep the mulch clear of the plant stem as contact can cause collar rot. However, some tree planters report that mice and insects can colonise the area under the mulch and damage the roots, so keep an eye out for any problems.

If using newspaper for mulch, scalp site first to form a dish for water to collect, to guard against water running off the paper and away from the plant.

Guarding and Staking

Placing tree guards around your seedling is critical in enhancing the survival rate of your seedlings. They are instrumental in preventing rabbits and hares from eating the tasty new seedling shoots, protect the seedlings from winds and help maintain a warm and moist environment around the seedlings.

In many areas, the failure to place tree guards result in a high loss of seedlings. While it is an additional expense, the increased survival rate is worth it.

Tree guards come in various sizes, with differing costs involved. The most economical guards are milk cartons, which are held in by two bamboo stakes. These are more suitable for areas with the softer loamy or sandy soils; the bamboo stakes are difficult to get in to hard, clay soils.

Another common tree guard is the plastic sleeve, which is held in by three hard wood stakes. While these are more expensive, they are larger and therefore afford a greater level of protection, they allow more light through to the seedlings and are more suitable for harder ground as the stakes can be hammered in. However, plastic guards should not be used near waterways, as the guards can easily get in to the waterway, damaging water flow and posing a risk to fish and wildlife.

Plastic tree guards should be removed after the seedlings are healthy and well established – usually after 3-4 years, to prevent the plastic from blowing away and causing a litter problem.. Milk cartons may not need to be removed as they are biodegradable; however they still can cause a litter problem, so keep an eye on them.

Where wallabies are a problem, tall and sturdy tree guards may be necessary. There is now a range of wire and plastic guards available for differing conditions. Seek out advice for what is the most successful in your area.

Even in wet or windy situations it is usually unnecessary to stake seedlings. Generally, staking results in weak lateral root development, as the seedlings do not need to build up their own strength against the wind. Staking may be necessary where advanced trees are used.

Protecting your trees

The best step to successful tree protection is to ensure that an effective ongoing rabbit and hare control program is in place. Rabbit control techniques include harbour destruction, poisoning, fumigation and fencing. For further advice on these control methods contact your local DSE office or landcare group.

Many species (eg Casuarina, Eucalypts) are attractive to hares and rabbits and in some areas cockatoos/corellas will pull out unguarded seedlings within hours of planting. Potential damage from rabbits and hares should never be underestimated and in some areas netting may be required. Alternatively some farmers report success with old tyres around the seedlings in deterring these pests.

Severe infestations of sawfly larvae, autumn gum-moth caterpillar or leaf skeletonisers can be controlled by manual removal or spraying with contact insecticide. A low toxic spray to control scale insects is white oil and a wetting agent – always follow the manufacturer's directions. Wingless grasshoppers may be sprayed with an appropriate contact insecticide or baited with bran sprayed with an appropriate contact insecticide as per the manufacturer's instructions.

Some species, including *Eucalyptus globulus* (Blue gum), *Eucalyptus tereticornis* (Forest red gum) and *Eucalyptus camaldulensis* (Red gum) are tolerant of occasional defoliation, which may avoid trees blowing over in early spring. Local species of acacias, banksias and bursaria aid long term control of insects by attracting insect eating birds, wasps and mammals. You may find this will also reduce insect attacks on your crops.

In most plantings there will be some loss of seedlings – up to 20% is not unusual. Some replacement of dead or poor performing trees may therefore be needed. It is always important to record the success of various species and methods of planting for future reference.

And most importantly, talk to other tree growers in your area and listen to their advice and experience. Have a look around your local area and observe the results already obtained.

Further information

For further information please contact TreeProject on ph. 9650 9477, DSE Customer Service Centre on 136 186 or Greening Australia Victoria on ph. 9457 3024.

Further references

R.Campbell, R. Chandler and G. Thomas. Victoria Felix: Improving Rural land with Trees, DCE

Oates N and Clarke Trees for the Back Paddock in Cremer K.W. (Ed.). Trees for Rural Australia

Campbell A and Burke S. Farm Tree Protection: A Practical Manual for Farm Tree Growers, DCE

Acknowledgments

This information sheet was based on the downloaded information sheet "Landcare Notes LC0104 – Preparing and Planting".

The advice provided in this information sheet is intended as a source of information only. We recommend seeking out local professional advice. Always read the label before using any of the products mentioned.