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Revegetating your farm



About this kit

This kit is designed to help you plan your revegetation projects, such as shelterbelt establishment, in order to maximise the benefits for nature conservation as well as meeting your agricultural production needs.

This kit covers the following topics:

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- Revegetation

 - Planning revegetation projects

 - Direct seeding

 - Direct planting of seedlings and tubestock

 - Monitoring.

Service sheets on revegetating and rehabilitating degraded bush are being developed by Bushcare Support, which is a Natural Heritage Trust program hosted in Tasmania by Greening Australia. The sheets will be available in 1999. They will include information on seed collection and germination, propagation and planting techniques, fencing options and costs, and site preparation. They will help you with the practical aspects of revegetation projects.

Revegetation

In the past two decades there have been many revegetation projects in Australia. Many of them have been undertaken through programs such as Landcare, One Billion Trees, and the Corridors of Green. Most of the projects have involved establishing shelterbelts, particularly on degraded land. Only a tiny proportion were planned specifically for the conservation of native bush and wildlife. However, many landowners said that although conservation was not the primary purpose of their planting it was a significant benefit. The challenge is to improve the wildlife habitat conservation aspects of these revegetation projects.

A good revegetation project is one that integrates the native bush into the whole farm enterprise. It may rehabilitate degraded land, use native vegetation productively, or improve wildlife habitat.

Revegetation is undertaken for a number of reasons, including:

- to establish wildlife habitat;
- to establish buffers to protect native bush;
- to link patches of remnant bush;
- to establish shelterbelts for stock or crop protection;
- to establish windbreaks for erosion control;
- to control run-off;
- to manage problems such as salinity and waterlogging;
- to establish commercial tree plantations or farm forestry.

It is much better to conserve your existing remnant bush and manage it well than try to re-establish it after it has been cleared. It cannot be emphasised enough that natural regeneration is the cheapest and most effective method of re-establishing or rehabilitating the bush on your property. Do not start thinking about any revegetation projects until you are sure that natural regeneration is not an option. Information on ways of maximising natural regeneration can be found in **Kit 2 Managing Your Bush**.

Revegetating to benefit wildlife

There are a number of ways that revegetation can be undertaken so that it maximises its value for wildlife.

Plant local native species

The best approach to revegetation is to plant local native species. Local native plants are those that occur naturally in your region. Plants native to other parts of Australia are not local native plants. For example, there are over twenty local species of wattle in Tasmania and these would be a better choice for revegetation than Ovens wattle or Cootamundra wattle which are not native to Tasmania. Similarly, Midlands wattle (*Acacia axillaris*) which is native to parts of the Midlands is being used across the state for revegetation projects but it should only be used in the St Paul, Elizabeth and Lake River catchments. Local species are more likely to provide the appropriate food, shelter and nesting materials for the insects, birds and animals of your area.

Revegetate to suit local conditions

Match your revegetation efforts to the local landscape. Choose species that suit the soil type and topography of your land. If you are revegetating a ridgeline, a north-facing slope or a riparian strip choose species that would naturally occur in that situation. This will also influence where you collect seed. For example, if you have collected blackwood seed from a swampy site it would not be advisable to use that seed or seedlings propagated from the seed on a nearby site if the soils were light and sandy or the site was drought-prone. This applies even if the site is only a few hundred metres away – it is important to match your plantings with the local environmental conditions.

Plant a diverse understorey

It is vital that revegetation is more than just planting trees – you need to establish a diverse understorey as well. The understorey is the layer of small trees, shrubs, herbs, grasses, ferns, mosses, fungi, lichens and creepers that occur naturally under trees. Look for a nearby patch of healthy bush that can serve as a template for what you are trying to re-establish on your farm. Determine how many layers there are in the bush and which species make up the different layers. Identify the dominant tree species. A mix of eucalypt species may be present, including smooth-barked species such as white gum, cabbage gum and black gum, and rough or stringy-barked species, such as peppermints and ashes. It is important to assess the structure of the shrub layer. There may be a need for tall shrubs and shorter shrubs in the species mix. There needs to be at least 20% shrub cover to provide habitat for birds. The ground layer is often overlooked in revegetation projects even though it is often the most important layer for wildlife. Try to include ground-hugging shrubs, grasses, sedges and wildflowers.

Establish a healthy ground layer

The ground layer plays a key role in the success of revegetation projects by helping to prevent soil erosion and retain moisture. This is particularly important where deep-ripping is required and where stock grazing has led to bare compacted topsoil. The ground layer provides habitat for small animals and invertebrates that contribute to the breakdown of litter and nutrients, and are a food source for bigger animals and birds. Healthy soils have a fine layer of cryptogams (mosses and lichens) that provide an important environment for seeds to germinate. Mosses and lichens are being added to seed mixes in some parts of Australia to improve the success of direct seeding projects.

Provide habitat

Habitat for wildlife can be provided by placing logs and branches on the ground. Leaf and grass litter, and small fallen twigs and branches are an important part of healthy bush. It is vital that you establish a ground cover similar to that which would have occurred naturally at the site. Include seed or seedlings of native grasses, herbs, ferns or small shrubs – whatever is appropriate – in your planting. Many birds need a diverse and healthy understorey. Once the understorey is degraded aggressive birds such as noisy miners move in and displace the bush birds.

It is also important to leave any older and dead trees as habitat for wildlife. Large old trees are used by many birds for nesting and foraging, and they provide a vantage spot or perching tree for some species. Tree hollows are also important for some species.

Bigger is better

The size of a patch of natural or revegetated bush is most important for wildlife: bigger is better. Wildlife conservation is improved by planting a single large block rather than several smaller ones or by revegetating around an existing small bush remnant to increase its size. Adding a buffer zone around an existing patch of bush creates more habitat and allows birds and animals to establish more easily. Smaller patches of bush support fewer animal and bird species and those that do establish tend to be generalist species such as possums and noisy miners.

Studies have shown that 10 ha is the minimum size for bush to provide habitat for most birds. Try and plant around small blocks so they are 10 ha or bigger. However, bush blocks smaller than 10 ha are still valuable for many species.

The rule that bigger is better also applies to the width of a natural or revegetated patch of bush. Try and make your revegetated patches as wide as possible. A compact shape is much better than a long thin strip. Most shelterbelts, even those planted as wildlife corridors, are long thin strips. Patches of natural or revegetated bush that have a high ratio of edge to area tend to be less viable. They are subject to 'edge effects' because they have a greater exposure to wind and sunlight, and a greater risk of weed invasion and damage by stock. Try to establish bush that has an interior and is not all edges. Stepping stones or small patches of bush may be better for conservation than a wildlife corridor.

Create a network of linked habitats

Try to plan your revegetation projects so that you create a set of bush networks or linkages. Small patches can be linked to larger patches. These links do not necessarily have to be connected – stepping stones that act as islands of habitat will allow some species to move from one area to the other. These patches should be no more than 1 km apart. Even isolated paddock trees surrounded by pasture may act as stepping stones for some species.

Planning revegetation projects

The key to successful revegetation is good planning. Your first step should be to decide on the aim or purpose of your project. Revegetation projects may have a number of aims and these will determine the plant species selected and the revegetation methods used.

Revegetation projects may need up to two years of planning before planting. If you wish to grow plants from the seed or cuttings of local plants you will need to collect the seed or plant material, propagate it, and grow the plants until they are ready for planting. In addition, site preparation will have to be done.

Select suitable plants

Before you start collecting seed it is important to work out a list of species that will suit your area and achieve your aims. Go to some nearby bush that is on a similar situation and soil type and see what is there. There are lots of books around to help you identify native plants so use these or ask your local Bushcare officer for help.

Each site will have a different set of criteria governing the plants selected for it. If you have a plant list from the bush in your area use it. Remember that some plant species are localised in their distribution so choose plants that grow in your area. For example, fringe myrtle (*Calytrix tetragona*) would be a suitable species for a coastal rehabilitation site on the Tasman Peninsula.

Seed is the most important ingredient for any revegetation project. Below are a number of rules that will help you improve the quality of the seed you collect:

- Use local native seed. Collect seed from as many plants as you can to increase genetic diversity.
- Collect seed from as close as possible to your site, or from sites with a similar geology, soil type, aspect and position on slope.
- Avoid collecting seed from isolated trees that are unlikely to have been cross-fertilised.
- Clean the seed by removing any leaves, twigs, flowers, etc.
- Store the seed in a plastic bag in the fridge, but make sure it is dry. Adding mothballs will kill any insects.
- Label the seed, write down the details of where it came from (aspect, slope, drainage, geology, etc.), and record the date of collection.
- Do not collect too much seed from one area or you may eventually cause extinction of some local species.

You are not allowed to collect seed from any threatened plant species that are listed on the Tasmanian *Threatened Species Protection Act 1995* without a permit from the Threatened Species Unit of the Department of Primary Industries, Water and Environment.

If you do not want to collect your own seed you can order it from various seed merchants in Tasmania. It is important to obtain provenanced seed because you need to know where the seed came from in order to understand what conditions will suit it. Involve your local nursery as they can be a valuable resource. Some plant growers are offering a service where they will come and collect seed from your local area, propagate it, and then plant it back on your property.

Prepare site

Site preparation increases the success of direct seeding and planting projects. It prepares a favorable niche for sowing and provides an environment that promotes root growth. When considering site preparation a number of factors need to be considered, including soil type, climate, topography, weeds and fencing.

Weed control is one of the most critical aspects of site preparation. Competition from weeds reduces the survival and growth of native species. Weed control is usually achieved through the application of herbicides, mulching of the site, or through mechanical or manual removal.

Deep ripping of sites may be beneficial to improve drainage. Find out from someone in your area or from Greening Australia what methods of ripping have been successful on your soil type. For example, deep or shallow, what spacing between the rip lines, what type of machinery to use, etc? Sandy soils derived from sandstone and windblown sands do not require deep ripping as they are well drained.

Fencing

One of the most important aspects of site preparation is fencing off the area to manage stock and native animal grazing. Fencing needs to be effective to make the financial investment worthwhile. The type of fencing will be determined by the situation and the type of animals to be excluded. Hills require different fencing to rivers, and cattle need different fencing to sheep. You will probably be in the best position to know what type of fencing best suits your property. If you need advice on fencing contact your local Landcare or Bushcare officer, Greening Australia, commercial fencing companies, or ask your neighbours.

Electric fencing may be a cheaper alternative in areas where you do not require a permanent fence or rabbit proofing. However, they do involve regular maintenance. You can use electric fencing while regenerating a patch of bush or around paddock trees and remove it when the seedlings and saplings are old enough to survive stock grazing.

When to direct seed or plant

The key to successfully establishing plants is to plant or sow when conditions are suitable. The key factor is adequate soil moisture, and this is more critical than sowing time. As a rule of thumb, August to September is the optimal time. However, use any window of opportunity. If you have heavy rain and you think the soil moisture will remain high for a while and you have plants ready then plant while conditions are good.

Short-term weather forecasting has become quite accurate. Ring the Bureau of Meteorology and check if conditions will be suitable – many farmers currently do this to select the most suitable time to sow a crop. Revegetating land is expensive and time consuming so this information will optimise your efforts. Long-term climatic information can also be helpful. For example, if an El Niño year is predicted it may be better to delay your revegetation until conditions are more suitable.

Follow-up

Follow-up watering should not be necessary if ground preparation and soil moisture at planting were right. Remember watering often promotes weed growth and may not be necessary for native plants – use your judgement.

Follow-up weed control is often required. A shielded sprayer or hand chipping can be used. This requires care and sometimes can be avoided if good weed control was achieved before planting. If the weeds are not causing any threat it is best to leave them alone as your efforts are likely to result in other weeds colonising the area.

After seeding or planting keep a record of the date and type of any maintenance, such as weeding, rabbit control or watering of seedlings.

In subsequent years replace your losses and continue to control weeds and feral animals. Record any replacement plantings. Some direct seeded projects may need thinning to reduce competition.

Direct seeding

Direct seeding is an efficient and economic option for revegetation projects, but there are many situations where it cannot be used. Direct seeding involves sowing the seeds of trees and shrubs directly into the soil. Large areas can be revegetated using direct seeding and it often allows a greater variety of species to be planted. The plants that establish are likely to be more hardy and will not have the added stress of having interrupted root growth while potted, and root hair damage during planting. In addition, there is little risk of introducing new weeds and harmful soil pathogens from the potting mix as can happen when direct planting is used.

For direct seeding to be successful you will need a plentiful seed supply and a moist, weed-free seedbed. Weed growth is a major factor in unsuccessful direct seeding, along with poor seedbed preparation, grazing by stock and native animals, and poor weather conditions.

Preparing your seedbed

The best preparation method depends on the soil type and the site conditions. The site should be weed free for about nine months after sowing to allow the seedlings to establish. A good seedbed can be prepared in a number of ways, including:

- grading plus scarifying or ripping;
- mouldboard ploughing;
- a combination of knockdown and residual herbicides;
- scalping one metre diameter spots with a mattock or rake-hoe;
- deep ripping 6-9 months before sowing, depending on the soil type and the past land use;
- burning to create an ashbed.

Sowing techniques

Some species will require pre-germination treatment before sowing to break dormancy or achieve higher germination rates. Direct seeding techniques include:

- Sow by hand and bulk seed with dry sawdust, vermiculite or sand. Cover seed lightly to a depth of about five times the diameter of the seed by dragging a weighted hessian bag or other means.
- Sow with a tree seeding machine (e.g. Chatfield, Eco, GreenTech, Shelterbelter, Redden or Hamilton Tree Seeders). Make sure that seeds are pressed into the ground and lightly covered. The Eco Tree Seeder and Chatfield Seeder require seeds to be bulked with chicken crumbles. Sand and sawdust are also used to bulk out seeds.
- Sow most seeds at a rate of 300-1,000 grams per kilometre. It is best to test the germination rate of each batch of seeds, although this can be costly, about \$35 per species.
- Don't be confined to direct seeding in rows. Some farmers have direct seeded in gentle waving lines around the contour of a hill which achieves a more natural effect in the long term.
- Bitumen emulsion or Curasol sprayed over the seedlings helps retain soil moisture and aids seedling establishment, especially of eucalypt seeds.

Direct planting of seedlings and tubestock

There are many situations where direct seeding is not an appropriate revegetation technique and it will be necessary to plant seedlings or tubestock. For example, the site may be too steep or rocky, the soils may be poor or difficult to work with, or access may be too difficult.

Getting your plants ready

A lot of leaves on the plant is not necessarily a good thing. Ideally, the plant should have an equal ratio of root to shoot. If your pot is 125 mm high the plant should be between 125 mm and 200 mm high. If your plants are too tall trim them to less than 150 mm but make sure that there are enough leaves left for them to survive. If too many leaves remain on the plant it causes movement of the root system due to wind. This means the new delicate roots will be constantly broken off and a good root system will not develop. This will result in a high plant mortality over the dry period.

Guard against rabbits and hares, and rabbit proof the entire area if possible. While this may seem like an expensive option initially, the costs of revegetating add up and may be less effective without it. Fencing your plantings allows more flexibility. For example, you may choose not to plant in rows.

When to plant

Plant when the soil is moist. Tubestock can be planted at any time of year as long as the soil is moist. Plants tend to grow roots in winter and leaves in summer so winter plantings are more beneficial and there is generally more moisture around. However, in frost-prone areas it may be more practical to plant between October and November. Bare-rooted seedlings should be planted in late winter.

Planting

Plant along the rip lines using a tree planting machine or a hand implement, such as a Hamilton Tree Planter, Potti Putki, or Hike Planter. Be sure to press the soil around the plant with a mallet or your foot to remove any air pockets. Watering also helps to reduce air pockets.

Water in plants if necessary. Mulch to reduce weeds and retain moisture, for example, with a 20 litre bucket of hardwood sawdust.

Monitoring

Monitoring your plantings helps you to improve on your early results and avoid repeating the same mistakes. If you have time you should record the following for each revegetation project:

- type and timing of ground preparation
- weed control methods
- climatic conditions leading up to and just after planting
- date of seeding or planting
- planting methods
- type of seeder
- type of tree guard
- type and quantity of mulch
- type of fertiliser, if used
- were the plants watered in and were there any subsequent waterings
- details of who supplied the seeds or plants
- size and quality of seedlings
- source of the seed (the supplier should be able to provide these details)
- number of individuals of each species planted
- survival of each species
- the height of the best performing species can be checked in the first six months after planting and should be measured at 2-3 years after planting.

