

Establishment

Introduction

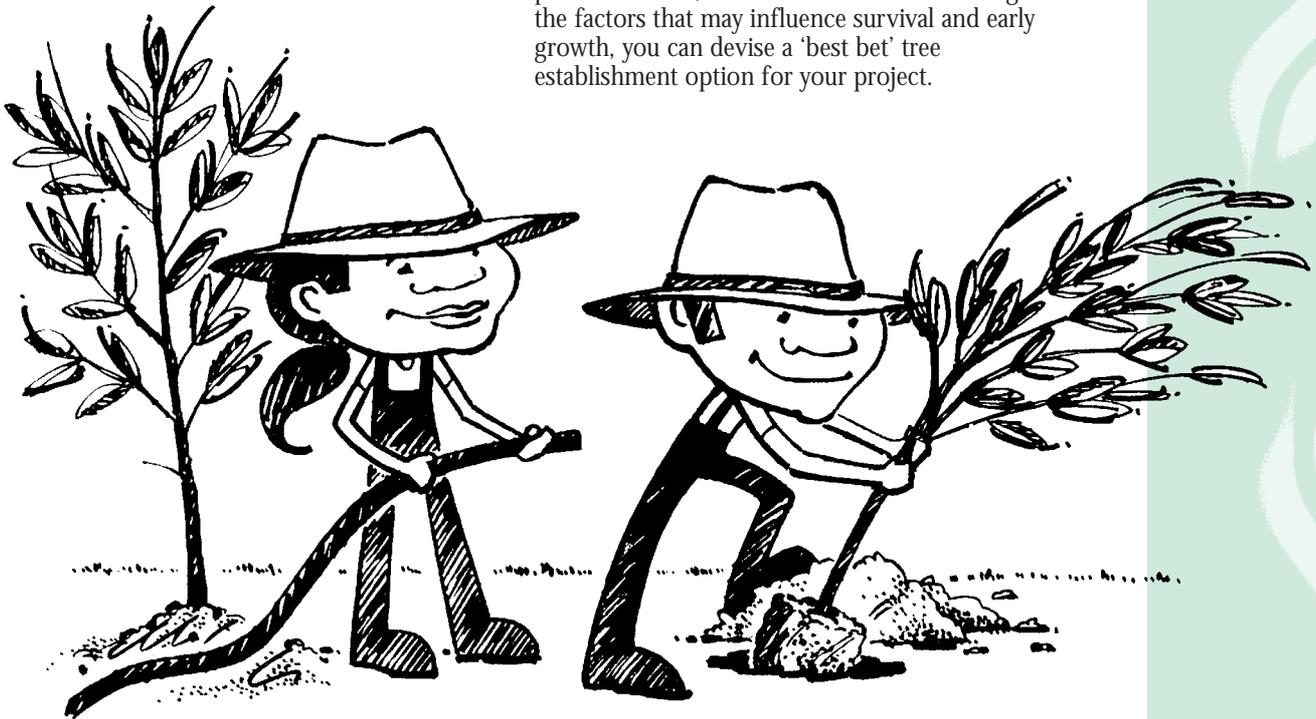
This book has highlighted many issues and we hope that you have gained a greater appreciation for the potential of making trees work for you. Many of the most important agroforestry decisions need to be made before the first tree is planted, but it is only by planting trees and getting started that you'll really gain an appreciation for the possibilities that agroforestry may offer.

How do I plant a tree?

The answer to this commonly asked question is always 'it depends': it depends on what you hope to achieve and on your skills and resources.

Try drawing a picture of what your plantation will look like in 10–20 years time, the distance between the trees and the relative size of trees of different species.

Think about how much variation in tree form or growth rate you are willing to accept. With this picture in mind, and with some understanding of the factors that may influence survival and early growth, you can devise a 'best bet' tree establishment option for your project.



Let's start by identifying some of the issues that will influence your choice.

Is the 'best' also the most 'appropriate'?

Intensive site preparation (soil cultivation, weed control, irrigation) can increase growth rates in the early years and ensure more even growth across the plantation. It is common practice in industrial forestry, for example, to deep rip and mound before planting. However, intensive site preparation is expensive, particularly for small areas or difficult sites.

Before simply copying the methods for site preparation used by other growers, landowners need to decide whether intensive preparation is really necessary.

For some plantation types, uniformity of growth is a critical requirement to ensure even log size and branch control. For many other purposes, including many commercial ventures, uniformity and maximum early growth rates are not so critical and the 'best' option may be to save some money on the establishment costs by doing the minimum required to achieve acceptable results.

Limiting factors

The key to determining the most appropriate establishment method lies in identifying the limiting factors for your project. There are two issues here:

- what are your limiting resources – time, cash, equipment or land?
- what are the limiting factors that will influence tree survival and growth on the site?

For an investment forestry company leasing or buying land for timber production, the limiting factor will generally be land. If the company is able

to justify its investment on the basis of projected returns then funds for establishment will probably be available. Under these circumstances it will use measures such as net present value (NPV) per hectare or internal rate of return to assess options and justify investment decisions.

For a farmer looking to grow trees for land conservation, shelter and income, limiting resources are more often time and money – not land.

Having identified the areas on the farm where trees are needed, the farmer's aim is to achieve the establishment of trees within a reasonable time given limited resources. The farmer therefore needs to assess his or her options. For example, if farmers can achieve 2 hectares of established trees for shelter or land protection at the same cost as the timber company spends on one hectare, they might be happy to accept reduced growth and timber returns in return for shelter and land protection benefits.

The quality of what you plant – tree genetics

Having decided to plant a particular species you may then be faced with choosing seedlings available in a range of pot sizes or as open-rooted stock. The choice largely depends on:

- initial cost;
- site preparation;
- planting technique;
- time of planting; and
- how quickly the trees can be planted out.

Of greater importance is the genetic quality of the stock.

Within almost every tree species there is enormous genetic variability. Whether you are interested in

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growth rates, frost resistance, branching habit, flowering times or wood characteristics you may be able to select a provenance (seedlot), improved seed or even clone that has the more desirable characteristics for your situation.

The use of indigenous seed to preserve or encourage native flora and wildlife is often considered important in farm planting. Where this is not critical, landowners need to consider their genetic options.

Intensive tree breeding and clonal selection can be complex and expensive. Many industrial forestry organisations are involved in cooperative breeding programs which concentrate on the improvement of particular traits in a limited range of species.

Landowners may be able to benefit from this work if they can buy stock selected for criteria similar or compatible with their own needs.

For example, a pulpwood company may select trees of high wood density, small branches and high growth rates. For a landowner interested in the same species for sawlog production these characteristics are also desirable. The stock may be more expensive but this needs to be considered in the light of better performance and, possibly, the need to plant fewer trees initially to ensure a good stand.

Be aware of what is on offer and, where you are unsure, you might choose to incorporate a range of genetic material. Keep records of seed sources and over time you'll identify the best seedlots. You may even be able to collect seeds or cuttings from the best trees for sale to nurseries or for your own use.

Weed control

The most important factor affecting survival and early tree growth is weed competition.

In this context a weed is anything that competes with a young tree for moisture or light. Removing competition using chemicals, mulch or cultivation will encourage more rapid early growth. The amount and timing of weed control required depend on the rate of growth of the trees and the weed type. For most purposes trees provided with a full growing season of weed control (within 1 m of the tree) will then be strong enough to fend for themselves.

Weed control in the second and subsequent years is usually only justified where tree growth is very slow or where there is extremely vigorous competition from deep-rooted grasses or woody weeds.

The most appropriate means of achieving effective weed control depends on many factors. Compare the costs, labour needs, period of effective control and the risk of environmental hazard in deciding on your best option.

Soil constraints

Waterlogging, hard pans and low fertility will all influence the selection of site preparation and planting technique. On some sites, survival and growth will be very poor without adequate soil preparation.

If your site has severe problems you may need to invest in deep ripping, mounding or cultivation to ensure any level of success.

The best methods will depend on the nature of the problem and your access to machinery or contractors that can do the work. On many sites, however, intensive soil preparation simply improves growth rates and uniformity.

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For most purposes, farmers may find that soil preparation is not essential and, for difficult sites or small areas, they may choose to save on costs and accept slower growth.

Many industrial plantation managers choose to use intensive ripping and mounding not so much to overcome soil problems but to reduce the costs of planting. Planting crews can work faster when planting into well worked soil. Good tillage may also allow open-rooted or very small seedlings to be planted instead of those in large pots which are more expensive to handle.

Protection

The final important point to consider is the protection of young trees from browsing and severe climatic conditions.

Rabbits, hares, deer, kangaroos and wallabies are common browsers of young trees. Domestic stock can be a serious problem if poorly controlled and this includes the landowner's own stock as well as those of neighbours.

Options for browsing control might include shooting and poisoning (where acceptable), repellents, tree guards, fencing or deterrents and will depend on the area, period of risk and the landowner's resources.

Insect damage to young trees can be extensive, especially during late summer when the trees might suffer moisture stress or when insect populations are high. Landowners should be aware of the risks and watch for signs of excessive defoliation. Although most species can tolerate quite high levels of defoliation, treatment may be warranted if trees are attacked repeatedly.

On some sites, promoting very rapid early height growth can lead to problems of windthrow. Tree form may not be critical when planting for conservation or shelter values but, for timber trees,

form is often the primary criterion affecting commercial value and even a small lean can make a tree uneconomic. Windthrow can occur on a range of soil types, especially waterlogged clays; although intensive soil cultivation may help overcome the problem on some sites it may encourage windthrow on others.

Frosts, hot winds, sand blasting and hail can destroy young trees. Guards are often used to reduce these risks although effective frost control is difficult. Once again, landowners need to assess the risks and make a judgement as to whether control is necessary.

Plant it and see

As farmers gain experience in tree growing they are refining their tree establishment methods. Low cost options, such as direct seeding, are often effective ways of developing agroforestry areas. For other landowners, seemingly uneconomic techniques involving a high labour requirement (such as mulching or guarding) might be considered appropriate.

Landowners should attend field days and visit other farms and industrial plantations in their area to see what seems to work for others.

At each site try to identify what the grower's objectives are, their limiting resources and note how they have chosen to deal with the issues of weed competition, soil factors and protection. Then, if possible, start small and learn from your own experience. You might also choose to trial different techniques to determine if, for example, ripping is necessary before tackling large areas.

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Establishment check list

- Prior spraying is often necessary for establishment
- Planting should be done when soil moisture is sufficient to sustain developing roots. A soil conditioning mixture will help establishment
- Fertilising may be necessary. Placing fertiliser in the planting hole reduces weeds
- Leguminous plants require inoculation with root bacteria
- Seeds may need scarification before planting
- Fencing will be needed to protect plants from stock during establishment and resting
- Protection from pests may be necessary. Pelleting may prevent consumption of smaller seeds by ants. Mixing species and planting only in small blocks reduce pest hazard and also lower the probability of diseases spreading
- Spraying may be needed, but you should think of alternatives if possible. Spraying may increase dependence on sprays because it kills predators. It may be better in the long term to tolerate some pest damage
- Protection from stock is usually necessary until plants are around 1.5 m high for sheep and about 2 m for cattle