



Planting Techniques for Natives



Using the correct planting techniques for establishing natives is critical to the success of any planting project. Good planting practice along with thorough site preparation, appropriate matching of species to each site, use of high quality planting stock and a consistent maintenance programme, all contribute to long-term survival, good growth rate and vigour of planted native trees and shrubs.

Guidelines that include methods for planting native trees have been produced by several authors including Evans (1983), Pollock (1986), Porteous (1993), Ministry of Forestry (1988), and Davis and Meurk (2001).



CONTRACT PLANTING vs LOCAL COMMUNITY PLANTING

There are two broad labour options for planting projects – voluntary labour provided by the local community, or experienced contractors who can either undertake the work or advise and supervise other workers (Davis and Meurk 2001).

Community-based planting

Voluntary labour greatly reduces costs and encourages community involvement. There is merit in volunteers being involved in on-going management of the restoration site, as it provides continuity and opportunities for locals to contribute to all stages of the project from planning to implementation, and allows communities to take 'ownership' of local projects.

Local community contributors can have a wide range of skills, energy and commitment. On the down side, some volunteers may lack experience and will make mistakes. Supervision therefore is an essential component and can require a lot of commitment and time.

Davis and Meurk (2001) provide advice on management of community-based planting projects including:

- Circulate clear information well before events to inform volunteers of the nature of the work, the location of the planting project, the starting time, and where necessary, what to bring such as tools, sun protection, warm clothing and lunch.
- As an incentive providing a free lunch and refreshments can boost participation.
- Project organisers must provide all the Health and Safety requirements including drinking water, extra supplies of sunscreen and first aid materials, and carry out any Health and Safety briefings.
- If a project is well established, casual voluntary labour may be counter-productive so a register of tried and proven individuals who can be relied on may be preferable. Specific workdays to suit this core of volunteers can then be organised.
- Volunteers will need careful supervision and guidance. One person should coordinate the entire operation, and they should be visible (bright safety vest) and centrally located to direct people to the correct places, or to other supervisors.
- Project supervisors will need to demonstrate the correct planting technique and this must be reinforced several times with key aspects of good planting emphasised.



Contract planting

For large-scale planting programmes that are well resourced the option of contracting experienced planters is often a practical option. However, care is required in ensuring that hired contractors are nevertheless experienced in planting native tree and shrub species. Some contract planters who only have exotic pine planting experience may be reluctant to modify planting practices for establishing larger native plants raised in containers, or may not be aware of extra care required for natives.

As with community-based volunteers, planting programmes involving contractors still require good planning and supervision. This includes ensuring plants are on the site in time, adequate site preparation has been carried out, planters are fully informed of what to plant and where, and some form of quality control is undertaken.

PLANTING TIME

Seasonal and annual climatic conditions influence the success of planting programmes (Bergin and Gea 2007). The time of planting depends on how prone the site is to drought and frost, and the species being planted. This is especially important when open exposed sites are to be planted.

On cool upland sites and more southerly regions, native trees are best planted in early spring when the heaviest frosts are over. Newly establishing plants will struggle to survive during harsh winter conditions if planted in autumn or early winter.



Some seedlings are susceptible to frosting especially nursery-raised seedlings planted on frost-prone sites.

In warmer districts where frosts are light, native trees and shrubs can be planted from late autumn to early spring. However, on sites where winters are mild and summers are likely to be dry, autumn planting is likely to be more successful, ensuring seedlings are well established with maximum root development before summer drought sets in.

Unexpected droughts in autumn or spring can cause mortality of sensitive species. Out-of-season frosts can also cause considerable damage to newly flushing foliage of many natives but does not always kill seedlings. Staggering planting over several years may minimise losses in larger programmes due to infrequent extreme annual climatic effects.

The planting season can be extended in cold climates where natives are being planted within shelter of existing vegetation or after earlier plantings have established sufficient cover. Planting near wetlands and on moist stream banks should only take place after the water table has fallen in late spring to early summer (Davis and Meurk 2001).

Planting on hot, sunny or windy days should be avoided wherever possible (Porteous 1993).

TRANSPORTING AND STORING PLANTS

Care is required in transporting and storage of native plants to ensure they do not dry out or get damaged. Recommendations include:

- Avoid packing seedlings too tightly for transport; use containers or trays to assist in packing and transporting;
- Use covered trucks and trailers to transport seedlings;
- Do not leave containers or plants removed from root trainers in direct sunlight;
- Store plants out of the sun – use a breathable cover such as shade cloth if necessary;
- If plants are stored for an extended period, avoid excessively shady areas as they will become leggy and soft;
- Plants in storage must be watered regularly and thoroughly – as often as every 2 days in hot weather, otherwise every 3-4 days;
- Shelter plants from the wind and keep moist during transport; and
- All seedlings should be watered thoroughly before transporting to the planting site.



PLANTING TECHNIQUES

If planting is not done properly, it is inevitable that plants will become unthrifty, unstable or die, wasting time, money and effort. The key principles of good planting (based on Davis and Meurk 2001; Bergin and Gea 2007; Porteous 1993) are as follows:

- *Removal of container* - Remove plant from the container carefully, retaining as much soil around the roots as possible. Root systems of container-grown seedlings should be sufficiently developed to bind all the potting mix into a cohesive mass that does not disintegrate when removed from the pot and placed in the planting pit. Care is required in removing plants from root trainers where roots may be tangled with adjacent seedlings.
- *Checking root system* - Root-bound plants should ideally be rejected as should seedlings with grossly distorted or under-developed root systems. Root-bound plants are slow-growing and plants with distorted roots are vulnerable to instability even decades after planting. If they have to be used, the root ball needs to be loosened, and any fibrous roots teased out or cut to encourage growth into the surrounding soil after planting. The soil-root mass should be moist, but not wet or it will be hard to handle.
- *Cultivation* - Loosening of soil around the planting position is likely to be beneficial on the most difficult substrates such as heavy clay soils or where compaction is evident. This will improve drainage and encourage early root penetration. Post hole borers can be effective in large planting programmes but care is required to ensure that sides of holes are not glazed as that can prevent root penetration. Scoring the sides of bored holes with a spade will reduce this problem.



Remove plant from the container carefully, retaining as much soil around the roots as possible.



Checking the root system of container-grown plants of native trees and shrubs before planting is essential to ensure root systems are not pot bound, grossly distorted or under-developed.



Native trees and shrubs are commonly raised in PB3 planter bags (left) or in root trainers (right). Care is required in removing plants from root trainers as roots can be tangled between adjacent plants.

- *Digging holes* - If necessary, skim dense grass cover off the soil surface using the spade (screefing). Do not remove too much topsoil. Dig a hole up to twice the size of the plant container, score the sides and loosen soil in the bottom of the hole. Use any removed grass as a mulch.
- *Depth of planting* - Each plant must be planted at the correct depth to make best use of soil moisture or to avoid waterlogging in wet sites. For large planting stock at least 50 cm high, the planting hole needs to be deep enough for the collar (base of the stem) to sit at least 5 cm below adjacent soil surface. This is especially critical on dry sites.
- *Planting* - Place plant in hole so the base of its stem is the correct depth below the adjacent soil surface. Gradually add soil around the roots, firming each layer. Firm the soil well after planting, leaving a slight depression (in unsaturated soils) to catch any rain or water run-off.
- *Marking planting sites* - For small-scale projects, after planting is completed, and particularly on sites where weed growth is expected to be vigorous, a stake placed next to each seedling can be useful to identify location. It is not necessary to tie plants to the stakes as they grow if ties are not later removed. In urban areas, stakes can attract vandalism. Staking small and slow-growing plants helps prevent them being lost, smothered by grass, or damaged by weedeaters. Using stakes for large-scale planting is impractical and costly so is not recommended.



Good growing practice for natives is digging a well-cultivated hole that accommodates the root system.



Place plant in hole so the base of its stem is a few centimetres below the adjacent soil surface.



ONGOING MAINTENANCE AFTER PLANTING

Reducing browsing damage

Areas to be planted with natives require permanent fencing to exclude grazing stock. While wild animals such as rabbits should be controlled (refer to Article No. 7.2 in this Handbook), it is inevitable that on some sites animal pest control may not be totally effective. Application of animal repellents immediately before, or at planting time is an option although these will need to be repeated after heavy rain. In areas of tall rank grass or similarly high weed growth, the option of planting in cleared gaps amongst tall grass may help deter rabbits accessing group-planted natives.



The best method for reducing browsing damage of newly planted native trees and shrubs is permanent fencing to exclude grazing stock and ongoing control programmes to keep rabbits and hare populations to low levels.

Artificial shelter

Artificial shelter can be an effective option on some sites to improve growing conditions of planted seedlings and to deter animal browsing (Davis and Meurk 2001). However some caution is required with tree protectors as they can restrict the development of branches and foliage or cause heat stress. For small-scale planted areas, there is scope for erecting a 1 m high fence with shaded cloth to surround plants on exposed sites.

Installing artificial shelter adds significantly to the cost of planting and is not likely to be practical on a large scale.

Using hydrogel

Rain/water crystals could be added to the planting soil in drier areas to help retain moisture, though their effectiveness in the outdoors is unclear. For example, in two sand dune trials, hydrogel had no effect on plant growth or survival (Bergin and Kimberley 1999). Until



Use of artificial shelter to protect seedlings such as this windcloth fence around a small group of planted natives is not practical on a large scale.

further research indicates otherwise, use of hydrogels for large-scale planting programmes with natives is not considered necessary.

Fertiliser application

Davis and Meurk (2001) considered that fertiliser is not normally needed for planted native species. Fertiliser can easily give a competitive advantage to weeds. On upland sites, the effects of fertiliser treatment at time of planting were often confounded by other factors such as degree of weed growth (Bergin & Pardy 1987). On grossly nutrient-deficient soils, fertiliser incorporated into the planting hole may stimulate growth. Broadcast application is likely to encourage weed growth.

Slow-release NPK fertiliser improved growth of kauri planted in gaps in 3-4 m-high scrub on nutrient-poor heavy clay soils on the Coromandel Peninsula (Bergin and Kimberley 1987). Height and diameter of 5-year-old trees had been increased by application of Magamp (50 g per seedling) at time of planting. Doubling the rate of Magamp appeared to be detrimental to growth and survival, and application 12 months after planting did not stimulate growth. Lloyd (1977) suggested that fertiliser applied in the early stages of establishment would improve plant vigour but not necessarily height growth.

If fertiliser is used at planting, then the incorporation of a slow-release fertiliser in granule or tablet form should be incorporated with soil in the hole at time of planting. Slow-release fertilisers need to be in contact with moist soil to work.



Use of synthetic weed mats are not practical or cost-effective for large-scale planting projects. They must be pinned down, may not decompose and can be difficult to remove when no longer required.

Watering

Watering should not be necessary after planting if well-conditioned nursery stock are planted in the right place at the right time of the year (Davis and Meurk 2001). In dry sites, droughts are unpredictable and irrigation (if practical) in the first year may reduce the loss of valuable plants. Irrigation on a large scale is generally not practical or cost-effective.

Mulching

Mulching plants with a layer of permeable material can be beneficial to retain soil moisture, reduce weed growth and provide soil insulation (Davis and Meurk 2001). However, the use of mulches in large scale planting programmes is impractical.

Where mulching is used, low-cost methods and materials that will degrade naturally are preferred, such as newspaper (at least 6 sheets thick), fine bark chips (10 cm deep), wool mat or carpet underlay, coconut matting, straw or dead vegetation. The latter two options may contain weed seeds.

Synthetic weed mats can be pinned down with wire and used on steep sites. However, they do not decompose, they prevent the development of an organic layer on the soil and are difficult to remove when they are no longer needed.

Replacing plants

Replacement of dead plants (known as “blanking”) may be advisable, especially to fill in large gaps. Depending on growth, this may be feasible for at least 2 years after the original planting was done.





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