9. Planting

TOOLS AND PEOPLE MANAGEMENT

You have two broad labour options for planting projects. You can rely on voluntary labour, or you can make use of trained people or experienced contractors, either to do the work or to advise and supervise other workers.

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. Bear in mind that volunteers have a wide range of skills, energy and commitment. On the down side, some volunteers may lack experience and will make mistakes, and supervision can require a lot of commitment and time. If your project is well established, you may find that casual voluntary labour is counter-productive and that it is better to build up a register of tried and proven individuals. Specific workdays can be organised for these helpers.

Careful management is needed to ensure people enjoy themselves and the planting is productive and done correctly. Make sure you tell volunteers the starting time, how to find the site and what to bring – tools, sun protection, warm clothing, lunch and drinking water. The project organisers should provide some of these, as it is important to maintain the good will of volunteers. Health and Safety requirements will probably mean that water, extra supplies of sunscreen and first aid materials must be provided.

Your volunteers will need careful supervision and guidance. One person should co-ordinate 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.

Even experienced gardeners may be unfamiliar with the conditions of semi-wild places – stony, shallow, compacted or dry soils where the key priority is to prevent the plants drying out. You will need to demonstrate the correct planting technique, and provide a handout with clear instructions or diagrams. Experience shows that techniques must be reinforced several times, as people’s expectations are influenced by their home gardens with soft soils and water on tap.

- Ensure that sufficient tools are available for the different stages of the project.
- Obtain any specialist tools and equipment well in advance of being needed, e.g., planting spades, tractors, chainsaws and spray equipment.
- Follow Health and Safety and any other legal requirements, like those relating to the use of poisons and machinery.
- Closely supervise inexperienced people, particularly children, families and school groups.
- Encourage children in particular to wear hats and use sunscreen if sunburn is likely.
• Make sure supervisors oversee the planting work.
• Limit the number of plants per person or group, so the planting is done properly and not rushed.
• Do not over-work volunteers, as they may not come back and are more likely to make mistakes.

TIMING

The time of planting depends on how prone the site is to drought and frost, and the species being planted.

• Plant in autumn and winter where frosts are light, winters are mild and summers are likely to be dry. This will allow maximum root development while moisture is available.
• Plant less hardy species or on very cold sites in spring when the frost risk is less. Alternatively, plant under shelter or after earlier plantings have established sufficient cover.
• Plant wetlands and moist stream banks in late spring to early summer, after the water table has fallen.
• Plant sand tussock, pingao and spinifex/kōwhangatara in foredunes from autumn to spring (Bergin 1999, Bergin 2000, Bergin and Herbert 1998).

Caution

Do not plant nursery-grown woody wetland plants in saturated soils - they can die as aerated root tissue, which allows them to breathe, will not have developed.

Avoid planting on hot, sunny or windy days (Porteous 1993) if possible. If this is not practical once arrangements have been made with volunteers, you must keep plant roots moist and cool.
Transporting and storing plants

It is important to store and transport plants as suggested, or they will dry out or be damaged.

- Do not leave containers or plants removed from root trainers in direct sunlight.
- Store plants out of the sun - use shade cloth if necessary.
- If plants are stored for an extended period, avoid excessively shady areas as they will become leggy and soft.
- Water stored plants regularly and thoroughly, every 2 days in hot weather, otherwise every 3-4 days.
- Shelter plants from the wind and keep moist during transport in an open trailer or vehicle.

PLANT NUMBERS AND SPACINGS

Distribute plants centrally, or put them out in their planting places before people arrive. The latter will ensure there is no wastage, for example all the expensive podocarps being planted in one place, too close together.

Normal planting density is around 1 plant per square metre. This is more costly than planting at wider spacings but it will achieve more rapid control over grass and weed competition. Planting small stock densely will minimise costs and allow for losses from natural mortality. If grass control will be infrequent, less dense planting of larger grade plants may be appropriate on moist sites or in deep soils. Remember that you will not be planting all species at the outset, and you need to allow for this in your placing of the plants.

In practice, you will use different spacing for different plant types.

- Allow spacings of 3-10 m for large canopy and podocarp trees (1000-100 plants per hectare).
- Allow 1-2 m for small trees (kōhūhu), and 1 m for shrubs and large tussocks (toetoe) (10 000-2500 plants per hectare).
• Allow 0.5 m for ground cover plants and small tussocks (ferns, rushes and sedges) (40 000 plants per hectare)

• Allow planting densities of 0.5-0.6 m on sand dunes for pingao, sand tussock and spinifex/kōwhangatara (40 000 plants per hectare) (Bergin 1999, Bergin 2000, Bergin and Herbert 1998).

Figure 3: Restored forest showing different spacings of large and small plants.

PLANTING TECHNIQUES

If planting is not done properly, your valuable plants will inevitably die, wasting time, money and effort. You need to show people how to open root trainers, so they can be re-used and the plants are not damaged. The soil-root mass should be moist, but not wet or it will be hard to handle. Each plant must be planted at the correct depth to make best use of soil moisture or to avoid waterlogging in wet sites.

Planting depths

The planting hole needs to be deep enough for the collar (base of the stem) to sit:

• 1-2 cm below adjacent soil surface on sites with reasonable moisture.
• Up to 5 cm below the adjacent soil surface on dry sites.
• At least 5 cm below the adjacent sand surface on sand dunes (Bergin 1999, Bergin 2000, Bergin and Herbert 1998).
• 2 cm above the adjacent soil surface in saturated sites.
Planting steps

- Soak plants before planting, but leave to drain and keep out of direct sunlight.
- Skim any grass regrowth off the soil surface using a spade or grubber (screefing). Do not damage other plant roots or remove too much topsoil.
- Turn over the cleared patch (Porteous 1993), or use the removed grass as a mulch.
- Dig a hole twice the size of the plant container, score the sides and loosen soil in the bottom of the hole.
- Add water to the hole in dry areas, if it is available.
- Remove plant from the container carefully, retaining as much soil around the roots as possible.
- Untangle or prune roots if necessary.
- Trim the bottom 2-3 cm off the root plug of root-trainer plants to encourage root growth (Porteous 1993).
- 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.
- In droughty situations, thoroughly water the plants and do not water again for at least 2 weeks.
- Apply animal repellents immediately before, or at planting time (see section 10, Animal Pests and Stock, and Table 8).
Good root structure is critical

Avoid root-bound plants. If they have to be used as a last resort, severely root prune them with a sharp spade, secateurs or knife. Root-bound plants are slow-growing and vulnerable to damage. This is more of a problem with woody than grassy plants.

- Producing root-bound plants is bad nursery practice and should be discouraged. If you have concerns, discuss them with your plant supplier.
- Fibrous roots can be trimmed, but if more substantial roots are severed, the plant will be vulnerable in a dry or stressed site.
- Plants stored for long periods need to be potted on to avoid them becoming root-bound.

After planting is completed, you could mark small, slow-growing or valuable plants with a stake to help locate them for later maintenance, especially if grass growth is likely to be vigorous. Do not tie plants to the stakes as it may damage them as they grow. In urban areas, stakes can attract vandalism. Use artificial shelter if needed, but be cautious about using tree protectors – they can restrict the development of branches and foliage or cause heat stress. Tree protectors are only suitable for tall leafless single-stemmed trees like ribbonwood/mānau and lacebark/houhere. 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 – in two sand dune trials, Hydrogel had no effect on plant growth or survival (Bergin and Kimberley 1999).

FERTILISER AND WATERING

In general, you do not need to apply fertiliser at time of planting. Broadcast fertiliser can easily give a competitive advantage to weeds. Fertilising and over-watering can also cause excessive soft growth, and reduce a plant’s hardiness.

Fertiliser will not normally be needed on natural soils. Even on difficult sites with poor soils native plants will grow well without fertiliser, and planting the correct
species at the right time of year should suffice (Porteous 1993). You should use fertiliser only where there are nutrient deficiencies or toxicities (Ross, Simcock and Gregg 1998). Sites that are degraded (slips/scrapes) or poisoned (mine/landfill) will benefit from N, P, K, S and lime to boost growth and plant succession or overcome toxicity (Langer, Davis and Ross 1999).

The other main exception is on foredunes, where existing vegetation benefits from fast release N fertiliser (see section 4, Coastal Dunelands and Banks (Bergin 1999, Bergin 2000, Bergin and Herbert 1998)).

If fertiliser is used at planting, don’t feed the weeds. Incorporate slow-release granules with soil in the planting hole, or sprinkle around the weed-free base of the target plant. Slow-release tablets like Agriform (Scotts) can be added to the planting hole. Alternatively, after planting make a 20-cm deep hole with a crowbar, and drop in a tablet beneath the foliage.

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, then mulched. In dry sites, droughts are unpredictable and irrigation (if practical) in the first year may reduce the loss of valuable plants and time. Plants should be gradually weaned off this water. Watering at very dry, remote sites can be done using containers that drip water onto the soil around the plants.

MULCHING

Mulching the plants with a layer of permeable material is essential to retain soil moisture, reduce weed growth and provide soil insulation. It is important to mulch sufficiently deeply, but be careful not to bury small plants. Use organic material if possible, as it breaks down to supply nutrients to the soil. These mulches will need renewing over time to maintain effective weed control.

Mulch the entire cleared area around each plant. Do not mulch naturally wet areas and stream edges as saturation and anaerobic conditions can develop - mulch can also be washed away and cause stream blockages. Once your plants are established and the canopy closes, mulching should not be needed.
Organic mulches

- Newspaper (at least 6 sheets thick)
- Fine bark chips (10cm deep)
- Wool mat or carpet underlay
- Coconut matting
- Straw or dead vegetation (may contain weed seeds).

Other types of mulch can be useful for weed suppression, but each has disadvantages:

- **Stones** can be used where they are available (e.g., in riverbeds), but reflected heat could scorch large-leaved plants.

- **Paper discs** can be used, but must be held down with stones, turfs or pinned with wire. The 30-cm discs are too small as grasses can still shade the plants and the weed roots extend under the discs. Thin discs break down relatively quickly; larger thicker ones may be more effective.

- **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.

- **Car tyres** (two or three) can be stacked around plants at dry exposed sites to provide shelter, deter animals and suppress weeds. It can be awkward to move large numbers of tyres around, and they need to be removed later as they are an eyesore.