CHAPTER 6 - ESTABLISHMENT AND MANAGEMENT OPTIONS

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ESTABLISHMENT

Overview

Successful establishment practices will result in an evenly stocked, vigorous, uniform, and stable crop growing at or near its potential for the site. Establishment practices fall into the following five categories: site or land preparation, seedling quality, transport and storage of seedlings, planting practices and post-plant weed control.

The cypresses respond very well to good establishment practices. On benign sites it is sometimes possible to get away with having less than optimum establishment practices; however, as sites become harder and tougher (possible reasons include increasing altitude, aspect, weed competition, exposure, etc.) it is important that these practices tend towards the optimum for the site. These practices are additive so good and poor practices tend to cancel each other out. The most successful option is to strive for good establishment practices all the time.

Site or land preparation

Cypresses respond extremely well to good site or land preparation. This includes vegetation control and / or mechanical cultivation prior to planting. It can be as simple as hard grazing the site with sheep or cattle prior to planting or, at the other extreme, involve one or more of spraying, burning, root-raking, roller-crushing, ripping, mounding, and drainage. Whatever the practice, the objectives are the same – to provide a site which can be easily planted and give the newly planted seedlings the best possible start.

Establishment trials for macrocarpa and lusitanica were set up on a cut-over site (near Rotorua) and a pasture site (near Whangamata). The treatments tested were container-grown seedlings, bare-rooted seedlings, fertilizer application, weed control, and an anti-transpirant dip. Best growth and survival were obtained for container-grown seedlings, with fertilizer and weed control treatments. No response to the anti-transpirant was detected. On the cutover forest site, seedling type, fertilizer, and weed control treatments were more pronounced for macrocarpa than for lusitanica. On the pasture site, growth advantages were associated with bare-rooted seedlings of lusitanica and with bare-rooted seedlings in conjunction with weed control, while survival advantages were associated with container-grown seedlings of macrocarpa and with container-grown seedlings and weed control (Glass *et al.* 1991).

Seedling quality

Under ideal planting conditions, small seedlings transplant better than larger ones, with less interruption to their growth, but in practice a minimum size is required because the seedling must contain sufficient food reserves to survive handling and storage, and to produce new roots and shoots after planting.

Seedlings can be grown either as open ground (bare-rooted) or containerised planting stock, and both can be very successful. The root collar diameter is a good indicator of food reserves. For bare-rooted stock, a diameter of 5 mm for cypresses is recommended.

Transport and storage of seedlings

The transport and handling requirements of cypresses are very similar to those of other commonly planted species, namely radiata pine and eucalypts. They all require careful lifting, handling, packaging, storage, and transport to protect both stems and fragile root systems between the nursery and the planting site. Seedlings should be transported in rigid cartons to protect them from crushing and bruising. Always transport seedlings on their side or lying down. Transporting in an upright position can lead to bruised and damaged root systems. These root systems are fragile and easily damaged and must not be allowed to dry out. These roots are necessary for water capture and are important for early survival.

Ideally, seedlings should be returned to the ground the same day they are lifted; however, this is not always possible, so always store them in a cool place and out of the direct sun. Never let the roots dry out – sprinkle them with water if necessary.

Planting practices

The future root system of a tree is largely determined by the way the roots are positioned at time of planting. It is very easy to plant a seedling incorrectly, with the most common planting faults being:

- Not planting deeply enough
- Not cultivating the soil in the planting hole
- Not creating a hole big enough to accommodate the root system of the seedling without some distortion
- Dragging the roots into the planting hole so that they all point in the same direction which leads to unstable trees with “hockey stick” root systems.

The major factor leading to poor quality planting practices is trying to plant too many trees in an eight hour day. There are 480 minutes in an 8-hour working day – planting 480 trees per day is a minute per tree – this includes time spent walking from tree to tree, replenishing trees, and comfort stops. A minute per tree is not long when you consider that the tree, if it survives and grows, could be growing for 25-30 years. While 480 trees might be a low number to plant on a good site, it might be about right on some harder sites.

Cypress seedlings respond and grow very well when planted into cultivated or loosened soil. If the site has not been cultivated by machine, then it needs to be cultivated by hand at the time of planting. It is very important when planting to ensure that the root collar is buried 5-10 cm. This is particularly important for two reasons. Firstly, on drier sites, planting deeply ensures that the roots are below the soil surface which can dry out quickly. Secondly, on windy sites, planting deeply adds to the rigidity of the newly planted seedling and prevents swaying. Trials have shown that up to half of the stem of a seedling can be buried without affecting height growth the following season.

It is important to ensure that the planting hole is big enough to accommodate all the roots without bending or distorting them. The seedling’s roots are placed in the planting hole, and while holding the seedling stem, the planting hole is filled and then given a positive pull-up of 3-5 cm to straighten the roots. Following planting, the soil surface around the seedling is firmed with the sole of the boot, taking care not to strip the foliage or branches from the stem while doing so. In firming the soil, the aim should be to ensure that the surface is sufficiently compact to stop the seedling moving in the wind, but not to compact the soil too tightly around the roots – especially in wet soils.

The recommended time for planting depends very much on the area – particularly on the length of the growing season, which is largely dictated by the climate. Throughout much of the country, particularly in cooler regions, planting in May or June is not recommended because seedlings have to withstand all the vagaries of a winter climate before they can start to make new growth. Planting at the beginning of the growing season is recommended and this could be as late as

August/September in cooler parts of the South Island. In warmer parts of the upper North Island, earlier planting in July/August is usually warranted, before conditions become too warm and dry.

Well-established lusitanica plantation, Paengaroa, Te Puke

Planting weed control

To get the best survival and early growth from newly planted cypresses, any competing weeds should be eliminated or controlled until the newly planted seedlings are sufficiently well established to dominate the site.

Weeds can be controlled in spots around individual seedlings, in strips along the planting lines or over the whole site. Weed control can be carried out by mowing or slashing, hand or mechanical cultivation, mulching or by the use of chemicals. The most common method of weed control is by the use of chemicals, and there is a wide range available.

The questions to answer when deciding on what chemical to use are: what are the weed species to be controlled, and how tolerant are cypresses to those chemicals? The answers to these questions will determine whether firstly the chemical is suitable and secondly whether the chemical is applied before (pre-plant) or after planting (post-plant). Recommendations are given below:

Recommendations:	
Pre-plant Scrub (gorse, broom, blackberry) *Glyphosate / metsulfron* Grasses, herbaceous weeds *Glyphosate, Buster, Gardoprim*	Post-plant Grasses, herbaceous weeds *Gardoprim, Galant, Versatil*

MANAGEMENT OPTIONS

Overview

The cypresses produce a high quality, versatile timber which naturally has moderate durability. In addition, with good silviculture, they can also produce a very valuable timber. High quality cypress logs are straight and round in cross-section, with little evidence of fluting. Pruned logs should be of large diameter and yield a high content of clearwood. Unpruned logs should have small green or live branches thus making them suitable for not only structural but also appearance grade timbers.

There are three different management or silvicultural systems used to grow high quality cypress logs -namely pure stands, mixtures, and enrichment planting.

Pure stands or plantations

Cypresses can be managed very effectively as a plantation and in fact, today this is the main method of growing them. Cypress plantation management has had a checkered history. They had the reputation of being a difficult species to grow, which was compounded by the fact that they can also be expensive to grow. Much of this reputation can be attributed to macrocarpa and its susceptibility to cypress canker. This resulted in growers imagining that all cypresses were more difficult to grow than they really were.

There have been numerous silvicultural regimes implemented by growers over the years. Many of these regimes have mirrored developments in radiata pine silviculture and have proved to be less than successful. Today, however, there is an increasing consensus amongst growers towards a standardised cypress silvicultural regime. There is no perfect regime, the cypress industry needs many more years' experience before we have as much information as exists in the pine industry. However, current cypress recommendations (see Chapter 7 & 8) are to have an initial planting of about 1000 stems/ha (3 x 3 m = 1100 stems/ha) with approximately 300 stems/ha pruned to 4.5-6.0 m high, with one or more thinnings following the completion of pruning. Past silvicultural options such as low initial stockings, pre-emptive pruning and very early waste thinnings are no longer practised to any extent.

Mixed plantings (using a nurse or companion species)

This method involves growing cypresses with a nurse or companion species as an intimate mixture on the same site. Although the nurse crop will provide the cypress with protection against exposure, the main aim of it is to modify the environment and in particular the light levels in which the cypresses are growing. This in turn encourages better form and smaller branch development in the cypress crop, but typically it's at the expense of diameter growth.

The cypresses are a very branchy species with many problems caused by steep-angled and large branches. Average steepness of branches and branch size can be dramatically reduced by growing the trees under shade, and this is most easily achieved by using a taller nurse species. Similar effects can be obtained by planting adjacent to the south side of existing tall stands, or even by planting steep southerly faces.

Both eucalypts and radiata pine have been used successfully as nurse species for cypresses, but it requires a serious commitment of both time and money from the grower to ensure success. Mixtures have been tried by numerous growers over the years and apart from the odd rare stand, it is generally regarded as a less than successful method for growing cypresses.

Native scrub enrichment

Cypresses can be planted into cut or crushed lines / lanes, or light wells in regenerating native scrub. Commonly known as scrub enrichment, while not inexpensive it has the advantage of a relatively low initial impact. Good examples of enrichment planting can be found on the East Coast in manuka / kanuka stands and in Westland in regenerating hardwood scrub.

Pine and ovensii in mixture, Roydon Downs, Bay of Plenty.

Cypress planted in hand-cleared lanes of scrub, Southern Hawke's Bay

Key Points

- Cypresses require care in siting and establishment.
- Plantations require pruning and thinning to produce the best logs.
- Mixtures can be successfully established but need care in management.

Suggested reading:

Glass *et al.* 1991.