REDWOODS

Our own experience

Appletons have been enthusiastic promoters of Coastal Redwoods as a forestry and amenity tree, first listed on our one page trade list in the early 1970s. Initially grown in their hundreds and then in their thousands when keen farm foresters started experimenting with alternative timber species to *Pinus radiata*.

Bill Libby's enthusiasm for Sequoia while working in New Zealand on sabbatical leave from Berkley University has been infectious, starting the current resurgence of interest in this great tree. Bill's initial clonal introductions, the Kuser trials and farm forestry trial sites, along with Soper Wheeler's New Zealand Redwood Company extensive plantings, now have redwoods established over a wide range of sites throughout New Zealand. We have established both a seedling provenance trial and clonal trials on a number of sites, including a full Kuser trial at Motupiko.

Growing redwoods well is a challenge to both the nurseryman and the forester, however a well managed stand of tall redwoods is something most foresters aspire to. They are not as easy to grow as radiata, siting, weed control and fertility, are all factors to be considered, but when you get it right, the growth rates are impressive.

In 2006 we had the opportunity to plant a larger area on our Motupiko forestry block situated to the west of Golden Downs forest, on a low fertility clay gravel soil. Originally cleared from predominantly beech forest, burnt numerous times and reverted back to fern, heather and areas of gorse and broom, it was purchased from the adjoining dairy farm and planted in *Pinus radiata*.

Wind and storm damage at bottom third of stand.

Appletons supplied redwoods growing in a Nelson farm forestry plantation.

At 26 years of age the north facing side of the valley suffered wind storm damage to the bottom third of the stand and was hauler logged as it continued to blow over. Two years later a combination of a heavy wet snow and a similar wind storm, flattened 1600 ha of Nelson forests, and we had to harvest the south facing side of the valley.

Inspection of the wind thrown root balls showed a lack of strong healthy roots and distinctive flat bottomed pan effect to the root system. Boron had been applied, based on foliage sampling, and is naturally low on these

One-year-old redwoods.

Two-year-old redwoods.

clay soils. Upturned stump depressions are evident in the 60 hectares of remaining beech forest on the block, suggesting similar storm events in the past.

We decided to replant with a more strongly rooted tree species. Douglas fir was planted widely by the Forest Service in Golden Downs and grows well on a range of sites, coping with snow and severe wind storms with root grafting holding the whole stand together. Redwood stands are limited in comparison and are generally in valley bottoms, but these trees have grown tall and with large diameters for their age.

We decided to spread the risk of successful establishment and growth rates by interplanting the Douglas fir and redwoods as a 50-50 mix at 1600 stems per hectare. The planters carried both species, either side of their planting bags and planted alternative species in the same row. A full Kuser trial was established in the middle of the block, and will contribute valuable information when compared to more fertile North Island trial sites.

This winter we have the second 50 hectare site to plant and have fine tuned our establishment plan based on experience gained from our first planting four years ago.

We have delayed planting by 12 months to allow a second autumn aerial spray of glyphosate and metsulphuron to ensure we have full control of all fern, brush weeds and especially regenerating radiata seedlings. We recently had a crew cruise the first block cutting out the four year old regeneration with chainsaws, many had germinated in the cultivated planting spot and were out growing the Douglas fir and redwoods and had to be removed. Not a cheap option and in future we will hand pull all regenerating pines in the second year after planting.

Recent soil tests have shown that pH and all nutrients are low, especially boron, so hydroboracite was flown on at 100 kg per ha, and we will give consideration to spot fertilising with a NPK fertiliser, as trials have shown that redwood growth rates and foliage colour improve dramatically once it is applied.

Four-year-old redwood and douglas fir mix.

SPECIAL ATTRIBUTES OF SEQUOIA

Permanence

Felled cut stumps re-sprout creating a new crop and the live root system continues to hold the hillside together.

Flooding

In California, repeated flooding has deposited 9.1 metes of silt in a redwood stand, which has adapted by growing a new root system after each deposition.

Altitude

In Northern California redwoods grow on all aspects up to 1000 meters. Height and volume decrease due to dryness, exposure and altitude, while new growth is harmed by out of season frosts. They are largely unaffected by snowfalls. Do not tolerate direct salt laden winds and sites exposed to persistent strong winds.

Fifty seven-year-old Nelson redwoods.

Carbon storage

Californian data shows gross volumes of stem biomass, ranging from 1,330 to 3,461 m^3 /ha. A 90-year-old stand near Taumarunui is reported to have a basal area three times greater than measured in *Pinus radiata*.

Cut-over pines

Redwoods are showing very vigorous growth planted into cut-over *Pinus radiata* sites, beneficial conifer mycorrhizal root fungi being well established.

Mixed forest

In California redwoods grow mixed with Douglas fir. A good combination for permanent cover forestry with selective logging options.

Wind firm and withstands fire

Redwoods survive severe wind storm events better that most other species. The late Bill Gimblett, forester of Hawkes Bay, spoke of a four-year-old planting burnt in 1932 and then over planted with Douglas fir. All the redwoods re-sprouted from ground level and became the dominant crop. Later the Douglas fir were commercially thinned and some years later a cyclone flattened the remaining Douglas fir, not a single redwood went down. The redwoods trunks were brushed clear of branches to 25 metres.

KEY POINTS FOR SUCCESSFUL ESTABLISHMENT OF ALTERNATIVE TREE SPECIES FOLLOWING HARVESTING OF PINUS RADIATA

- You will be surprised how much fern and brush weeds re-establish after logging. Allow time for weeds to germinate and if your spray application does not achieve 100% control, consider delaying planting for a year and re-spray.
- Book your helicopter early to allow for the minimum 10 week withholding period for metsulphuron. GPS the area to assist with accurate planting area planning.
- Order the trees and book a planting crew well in advance. Plant the trees promptly and store tomorrow's trees in a cool building or under full shade. Check that the roots are moist at all times.
- Use a large spot spray circle when release spraying, especially where tall brush weeds, such as broom tend to over shadow the planted seedling. Herbicide recommendations vary between regions, soil types and weeds to be controlled. Seek expert advice locally.
- Keep the planting spot free of weeds and grass for two growth seasons, especially where summer dry periods are a problem.
- Use soil and foliage testing to check nutrient levels of alternative species. Logging disturbs the needle duff layer. It is full of mycorrhizae that are very beneficial to the next rotation of seedlings and people are often surprised how quickly other species grow following a crop of radiata. Be prepared to correct your boron and magnesium levels and spot fertilise if the foliage colour is not a healthy green.