CHAPTER 3 - SITE REQUIREMENTS and LAND USE

Site requirements

Blackwood is a tough and adaptable species. It will survive across a range of different site and climatic conditions. Unfortunately many blackwood stands in New Zealand have been poorly sited and this has resulted in slow growth and malformed trees. Experience has shown that, for both growth rate and form, it is highly responsive to site factors. When growing blackwood for timber therefore, it should be regarded as highly site selective. The first principle in growing blackwood successfully is careful site selection.

The main site requirements for blackwood are:

Shelter – this is critical. Early research showed that shelter is the main factor associated with good form in blackwood (see box over page). Shelter can be provided by topography (gullies), adjacent vegetation, or shelterbelt planting.

Moisture – adequate moisture throughout the growing season is important for blackwood. Although blackwood is not suited to drier sites, well-established trees can withstand occasional dry seasons and some drought. However, these are not good sites for producing blackwood timber.

Soil Type – Like most trees, blackwood grows best in mesic soils (neither wet nor dry), which have reasonable fertility, and a structure which retains moisture while allowing free drainage.

On dry exposed sites, blackwood is slow growing, bushy, and prone to insect (psyllid) damage. Blackwood will tolerate occasional flooding, but will not grow in stagnant swamps and is prone to root rots when drainage is impaired. However, it can tolerate peaty or clay soils.

Ideal sites for blackwood are sheltered gullies, and lower valley slopes (Fig 11).

Freedom from frost – Areas prone to severe frosts should be avoided (see box over page). In New Zealand blackwood can suffer from severe out-of-season frosts.

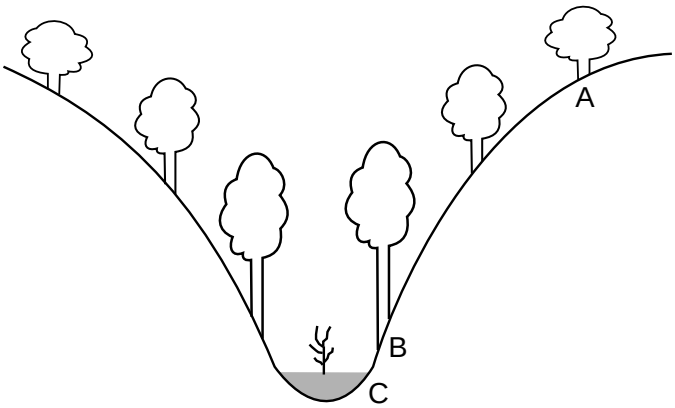

Figure 11: Where to site blackwood.
Growth is best in sheltered gully bottoms (B), much poorer on exposed ridges (A) and worst with mortality in poorly drained swamps (C).

Continuous-cover forestry

In response to environmental pressures, CCF is likely to become increasingly common in New Zealand. Blackwood has a number of attributes which make it suitable for inclusion in CCF systems:

- Moderate shade tolerance when young. As the trees mature, optimal growth requires full canopy exposure.
- Active regeneration from ground-stored seeds, coppice, and root suckering.
- Improved bole form when competing for light.
- Nitrogen fixation. This supports the growth of other species. A study has shown that kauri grow well in company with blackwood, much better and with lower mortality than when mixed with kanuka, a natural 'nurse' species for kauri.
- The valuable timber allows individual tree extraction.
- Native species regenerate freely under a blackwood canopy.
- The colour of blackwood foliage blends well with native species.

Ian Barton, a leading expert on CCF, regards blackwood as possibly the most useful exotic species for inclusion in CCF systems in New Zealand.

Land Use

Plantations

Blackwood integrates well with other tree species in forest landscapes. Because of its site requirements for optimal growth they should be carefully located in areas that are moist and sheltered. More exposed sites should be reserved for other species.

Interplanting

Blackwood is well suited to planting in regenerating scrub. This is discussed in Chapter 8.

Riparian Planting

Blackwood grows well in the sheltered damp conditions along stream margins. Its extensive root system helps to stabilise stream banks, and it tolerates occasional flooding. It is important to note that its seeds can move downstream, and may germinate and spread along stream margins. However, there is little evidence of this being a problem in New Zealand to date.

Open grown trees

In Tasmania, open grown blackwood is commonly seen on farms, as single trees (Fig 12) or in small groups. It is visually appealing, and provides good shelter for livestock. In these conditions it has large crowns, but boles are often too short for saw logs. Open-grown trees of this appearance are a lost opportunity – it is a simple matter to manage individual trees, and to extend the stem to a usable 3 to 4 metres by form-pruning at the appropriate time.

Gully planting

Many farms contain unproductive areas, including gullies. Stock is normally excluded from these areas because of steep contours, erosion, and proximity to streams. These sites can provide excellent conditions for growing blackwood.

Shelterbelts

Where soil moisture is adequate and prevailing winds not severe, blackwood can be used in a shelterbelt. Without silvicultural attention, the stems within the shelterbelt will usually become multileadered, and will not provide much usable timber. However, it takes very little effort when creating a shelterbelt to perform selective pruning, which will allow some timber extraction at a later date. This involves an annual visit to remove competing leaders and large branches to a height of 3 or 4 metres. If the site is not too exposed, lift pruning to 6 metres can be carried out with associated planting to provide low shelter.

Shelter

Sixty nine blackwood plantings in the North Island were surveyed in 1978. This study showed that while blackwood was tolerant of a wide range of site conditions, both bole length and tree height were positively affected by shelter. Similar observations of blackwood stands have been made in Westland.

Forest Research Permanent Sample Plots throughout the country have shown a striking range in estimated Site Indices (15 to 45 metres at 30 years).

A series of blackwood trials on five North Island sites showed the best growth in a sheltered valley bottom, and the poorest growth on an exposed ridge with clay soil. At age 14 years, individual plot MTH across the five trials ranged from 7.2 m on the poorest and most exposed site to 19.9 m on the best site.

Frost Resistance

Field studies have shown differences in frost resistance between seedlots from varying locations. These indicated that Tasmanian seedlots were the most frost-tolerant, with a few New Zealand progeny similar to those from Tasmania.

South African and Victorian seedlots were less tolerant. Frost damage was noted in an establishment trial near Rotorua (Tasmanian seedlot). The South Island replication of this trial near Reefton had excellent survival. Provenances from central Tasmania are more frost-tolerant than those from Smithton.

Agroforestry

Blackwood is a nitrogen-fixing (N2-fixing) tree, which has the potential to enhance understorey pasture yield and increase soil nitrogen (N) levels and availability. Trees in an agroforestry system also have the potential to reduce erosion and provide shelter for stock. See Chapter 4 for more information on agroforestry.

Waste water schemes

Blackwood has been shown to be tolerant of waste water application in several schemes where either meat works effluent, or treated domestic effluent have been applied. However, the growth rate of blackwood is too slow for it to be considered a biomass species for efficient nutrient removal and in most schemes faster growing species are preferred.

Figure 12: Open grown blackwood, a common sight in Tasmania.

Erosion control

The ability of blackwood to root sucker from broken roots (Fig 13) has been used to advantage with plantings on eroding land to stabilise slips. It has also been planted on road batters in New Zealand for this purpose. Blackwood was tested in some species trials on the East Coast of the North Island where it grew well, but it was considered that the erect habit made it unsuitable for unstable sites. However, as many eroding areas are also very exposed, other species may be more suitable.

Figure 13: Root suckers originating from damaged roots.

Key Points

- Blackwood requires careful siting.
- Blackwood grows best and shows best form on sheltered sites.
- Blackwood sites should provide adequate moisture for optimum growth.
- Frost prone sites should be avoided.
- Blackwood can be suitable for a wide range of land uses, for both timber and non-timber values.

Suggested reading:

Barton, Oliver, Nicholas, and Thorn 1991.

Franklin 1987.

FRI 1978.

FRI 1982.

FRI 1983.

Sheppard and Bulloch 1986.