DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

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SITE SELECTION FOR SUPERIOR MALLEE PRODUCTIVITY AND LANDCARE BENEFITS

ABOUT THIS SHEET

Here, the factors that determine growth rates of oil mallees are described, and guidelines presented to identify the best mallee sites on a farm so that landcare benefits, yields and potential profitability may be maximised.

INTRODUCTION

Before wheatbelt salinisation is to be halted, it is currently estimated that 20-30% of land must be under widely distributed arrays of deep-rooted woody perennials[1,2]. Fortunately, oil mallee species are available which are able to survive on almost every paddock in the wheatbelt, with the exception of those that are badly salinised.

Despite this, it makes sense to target potentially commercial tree plantings first of all to the sites where they will be able to grow most productively.

- Faster mallee growth leads directly to increased yields of eucalyptus oil, bioenergy or activated charcoal.
- The biomass production rate is directly linked to the amount of water used.

Oil mallees planted on well selected sites can grow to five times the size, and therefore pump five times as much water, as mallees planted on poor sites[3].

INCREASING GROWTH RATES THROUGH SITE SELECTION

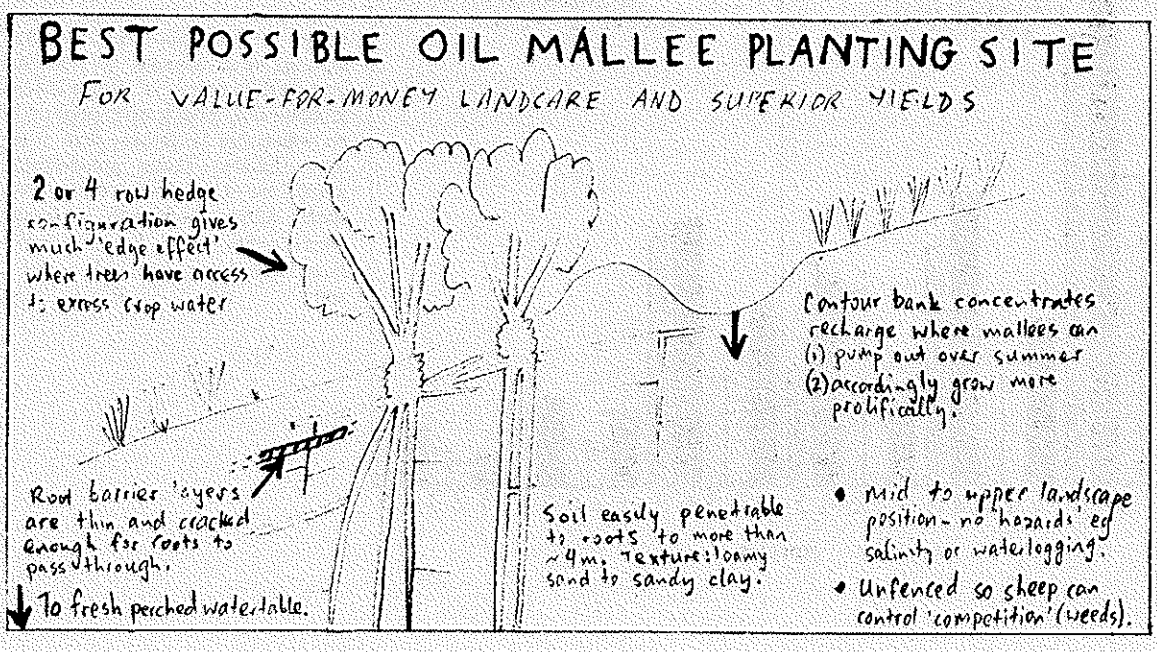
Growth rates of oil mallees are determined principally by the amount of water to which their roots have ready access[4]. This appears to over-shadow the effects of other factors such as soil fertility or pH. Some of the components that influence water availability to trees in the wheatbelt are:

- annual rainfall
- depth of upper permeable soil horizons
- whole soil profile penetrability to roots
- groundwater characteristics
- presence of localised subsurface flow paths for fresh water
- contour banks
- competition from weeds or planting layout
- 'hazards' to growth.

Of these, annual rainfall is not under growers control, nor can the presence of localised subsurface flow paths be easily recognised often. Nevertheless, this still leaves several site attributes which can be selected for.

Soil depth and penetrability is a major determinant of mallee growth rate[3]. Deep, easily penetrated soils are readily explored by root systems, allowing soil water to be easily accessed and groundwater bodies to be quickly reached. These soils are also usually better adept at storing up unused winter rainfall for use by mallees during their spring and summer growth flush.

Soil penetrability and depth is ideally determined by drilling to depths of 5-8m. This is more readily determined, for the shallow soil horizons at least, using a 1m thin steel rod as a probe - the ease with which tree roots will penetrate the soil may be judged feeling the resistance the probe



encounters. Mallees will grow faster where resistive layers are encountered deeper in the profile, and where these layers are neither too impermeable nor thick. In particular, excessively tight clay subsoils have been found to considerably reduce growth rates[3].

Mallees may also be allowed access to greater amounts of water by planting over fresh groundwater systems (Figure 1) and planting next to contour banks. Limiting the extent of competition encountered either with weeds or between neighbouring mallees also increases productivity[5]. In this regard, belt mallee plantings between cropped alleys have access to greater soil water reserves than do block planted mallees, where competition with one another is more intense.

'HAZARDS' TO MALLEE GROWTH

Hazards to be avoided where possible include shallow, saline water tables and waterlogging soils. Ironically, these effectively deprive mallees of water since roots are unable to grow and function properly. As a rule, the presence of barley grass on a saline area signifies the lower extreme of mallee planting sites - on these sites mallee growth, profitability and water uptake will be far from optimal. In fact, oil mallees grow better without access to any groundwater than when growing on shallow, saline groundwater (Figure 1).

SUMMARY

Oil mallees grow best, and therefore use most water, when planted where they have ready access to freely available water (see illustration overleaf). In this regard, site selection should consider overall soil profile depth and penetrability, and the presence of hard soil barrier layers (including tight duplex clay horizons) which are not greatly explored by mallees and uphold further root growth. In essence, sites should be selected where roots are likely to have access to as large a volume of soil possible. Value-for-money landcare is also gained by planting mallees away from saline valley floors, where growth rates and water use are retarded.

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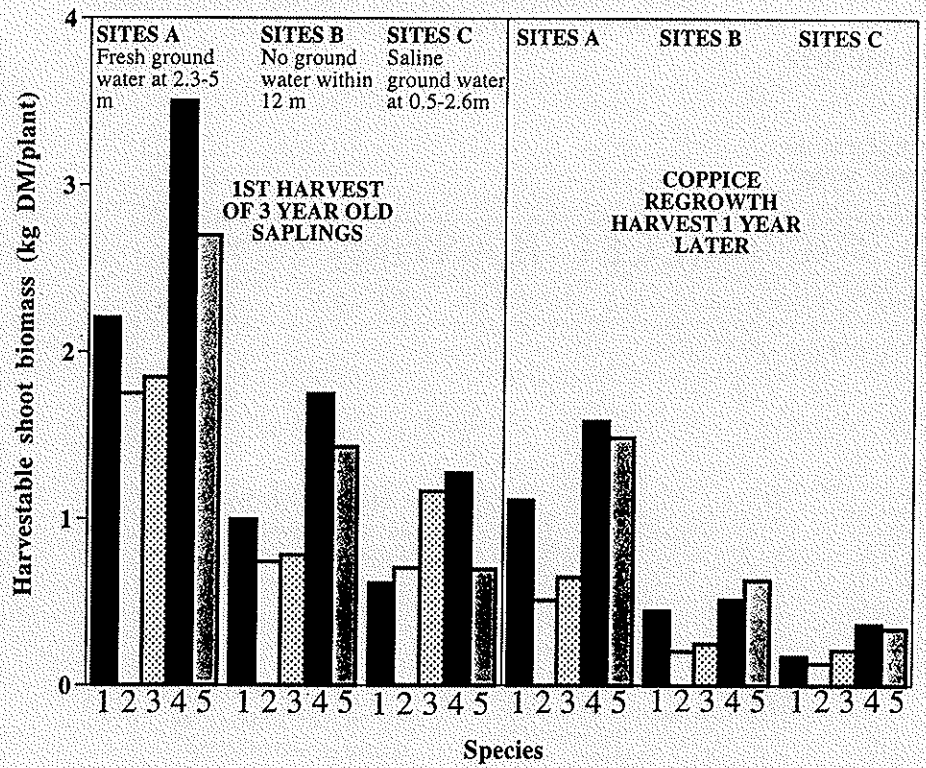

Figure 1. All mallee species, whether uncut saplings or as coppice, do best when planted over fresh watertables. In the absence of fresh groundwater, most species perform better when no watertable is present than when growing over shallow, saline groundwater. Species groups are (1) *E. kochii* subsp. *plenissima*, *E. kochii* subsp. *kochii* and *E. horistes*, (2) *E. angustissima*, (3) *E. vegrandis*, (4) *E. loxophleba* subsp. *lissophloia* and *E. gratiae*, and (5) *E. polybractea*.