DEPARTMENT OF CONSERVATION
AND LAND MANAGEMENT

SILVICULTURE SPECIFICATION 4/90

ESTABLISHMENT OF EUCALYPT PLANTATIONS

CONTENTS

1.0 SITE ASSESSMENT

In order to determine the appropriate level of site preparation and weed control required for the establishment of eucalypt plantations, the following features of a site need to be noted during the reconnaissance:

- soil texture and colour;

- depth of soil to rock, hardpan or clay;

- areas prone to inundation (e.g. flats, low-lying depressions, mid-slope seeps) requiring mounding;

- predominant weeds and grasses to be controlled.

The reconnaissance is best done with the farmer or other persons who have a detailed knowledge of the land.

In cases where major soil textural changes are evident (e.g. grey sandy pockets running into karri loams), or where soil depth is variable around 50 cm, a detailed soil survey is required.

The decision to soil-survey all or part of a property rests with the plantation establishment officer in charge of the planting. Soil surveys are to follow the same procedures as those for softwood establishment, with the addition of noting major weeds and grasses at each sample point.

Properties are to be soil-surveyed in the period from October to December, when soils are moist enough to be penetrated by a soil auger. This also allows sufficient lead time for site preparation and weed control.

The details of the soil survey and classification of its results will be the subject of a separate specification.

2.0 SITES TO AVOID

The following areas should not be broadscale planted:

- steep land where slopes are greater than 10 degrees;

- Gavin sand dunes on the Swan Coastal Plain, especially former bush sites;

- swamps and lakes on the Swan Coastal Plain and the Southern Coastal Plain, which should not be drained for wildlife conservation reasons;

- areas of native vegetation which are not degraded. These are defined as being at least 4 hectares in size and where at least 50% of the plant species that would occur in the natural condition are still present.

Clearing of such native vegetation on private land will also need to conform to guidelines currently being prepared by the Commissioner of Soil Conservation.

On gazetted water catchments, a licence to remove any trees must be obtained from the Water Authority before clearing can take place.

3.0 SPACING/STOCKING DENSITY FOR *E.GLOBULUS* PLANTATIONS

Annual Rainfall	Stocking spha	Spacing (m)
<750mm	830	4x3
750-1000mm	1000	4x2.5
>1000mm	1250	4x2
>1000mm (karri loams)	1666	3x2

For areas to be mounded with the Savannah Bedding Plough the spacing between rows may be varied alternately from 3 m apart to 5 m apart to allow machinery access. Spacing between seedlings should remain as listed in the table above.

4.0 SITE PREPARATION

4.1 Ex-Pasture

Deep Ripping (80 cm)

The aim is to fracture clay or hardpan in the dry summer months to allow root penetration and infiltration of water to depth and to increase the exploitable soil volume.

Deep ripping should be carried out on sites where clay or hardpan layer is within 50 cm of the surface of the soil. A winged tyne is required for this operation.

Boulders brought to the surface during this operation are to be pushed into heaps to improve access for subsequent operations.

Shallow Ripping (30-40 cm)

The aim is to break up compacted topsoil in preparation for planting. Shallow ripping is to be carried out on *all* ex-pasture sites except those to be cultivated and mounded or deep ripped.

Rip lines will also mark out planting lines to be sprayed with herbicide.

Shallow ripping prior to planting is not required on sites to be planted with the Chatfield tree planter, which rips and plants in a single pass. However, these sites will require line marking in conjunction with, or prior to, the knockdown/residual (K/R) spray operation (see section 5.5).

Ripping On Slopes

Slopes greater than 3 degrees are to be contour-ripped with a dozer. The first lines are to be pegged at the base of the slope and then repegged at abrupt changes of contour or as often as necessary to keep the machine on the contour.

Dozer operators must be experienced with contour ripping and preference will be given to machines fitted with levelling meters.

For details regarding the standards and procedure to be adopted refer to *Soil Conservation Manual* (in preparation - Environmental Protection Branch).

Mounding and Drainage

Pre-Mound Cultivation or Ripping

All mounding operations are to be preceded by some form of cultivation or ripping to allow roots to grow unimpeded into the subsurface soil. This should be carried out following total spraying of perennial weeds and grasses (see section 5.1).

Cultivation helps to break down the size of the soil clods before mounding and improves the quality and the profile of the mound formed.

Pre-mound deep ripping (where required) should be carried out after cultivation so that the mounder may follow the wheel tracks of the ripping machine.

Total Cultivation

Total cultivation in the form of disc and/or chisel ploughing is required on sites where soil clods are firm and difficult to break up, causing problems with machine planting, mounding and soil wettability. Sites included in this category are the organic podsols common in swampy, low-lying country and kikuyu-dominant pastures in the heavier country (see section 5.4).

Large Mound - Savannah Bedding Plough

To be carried out on poorly drained and low-lying sites where waterlogging and seasonal inundation occur. The aim is to lift the mounded soil out of the water to enhance the effectiveness of the herbicide and to ensure that seedlings are planted into a drained medium to eliminate waterlogging and encourage early growth.

Large mounds are to be used in preference to standard mounds on sites where the primary objective is to overcome waterlogging and drainage problems.

Standard Mound

To be carried out on sites where waterlogging may be a problem in unusual circumstances. For example, standard mounds are to be used on susceptible sites as an insurance against exceptionally wet seasons. Large mounds are to be used where waterlogging is the norm rather than the exception.

Standard mounds may also be used where cultivation and concentration of topsoil into the planting line are desired, especially on light dry sands common on the Swan Coastal Plain and east of Albany.

Drainage and Alignment

Mounded areas will require drainage and careful alignment to run water off the site to avoid waterlogging and erosion problems.

For details regarding standards and procedures refer to *Soil Conservation Manual* (in preparation - Environmental Protection Branch).

It is probable that small areas of localised depression and soaks cannot be drained. These areas should be identified in winter if possible and left unplanted (see section 2.0).

4.2 Ex-forested Sites

To achieve best results, clear at least 18 months before planting. Allow debris to stand 10-12 months in windrows and burn in late spring. Allow 3-4 months for eucalypt to develop, then foliar-spray (see Herbicide Manual, Technical Instruction Sheet No B8).

Plough the site in late summer/early autumn under dry soil conditions. Areas may then be prepared for planting (see section 4.1). Spray with knockdown/residual herbicide where invader weeds are likely to be a problem (see section 5.5). Interrow-cultivate in the summer following planting.

5.0 WEED CONTROL

The sheet number used throughout this section refers to the Herbicide Manual Technical Instructions.

5.1 Pre-Mounding Total Spray

The aim of pre-mound total spraying is to kill problem weeds (e.g. sorrel and dock) prior to mounding, and in particular to ensure that live weeds and grasses are not buried in the mound.

Perennial Weeds

Proposed mounded areas are to be total-sprayed prior to cultivation with a knockdown herbicide as follows:

Grass-Dominant: Spray Roundup at 4l/ha (Sheet B3), at least 1 week prior to cultivation.

Sorrell and Dock-Dominant: Spray Brushoff at 15-20 g/ha (Sheet B19) at least 2 weeks prior to cultivation. Use a Roundup/Brushoff mix at similar rates on mixed pasture species.

Annual Grasses: Pre-mounding total spray is not required on annual-based pastures if cultivation is carried out prior to the break of the season (before any germinants are evident). Mounding must follow cultivation closely to avoid mounding up post-cultivation germinants.

If the season has broken before cultivation has begun, and if cultivation might not control the early germinants, then strip-spray or total-spray with Roundup at 2-3 l/ha (Sheet B3).

5.2 Sorrel and Dock Control

Total spray with Brushoff at 15-20 g/ha (Sheet B19) except on fine light dry sands where wind erosion may be a problem. Sorrell and dock on these sites to be controlled using Brushoff at similar rates, in the K/R strip spray operation (see section 5.5)

5.3 Bracken Control

For best results, slash bracken in August/September and follow by burning. Then spray with Brush-Off at 50 g/ha (Sheet B9) in Spring when the fronds are fully expanded and growing vigorously.

If slashing and burning is not possible uneven-aged bracken can be sprayed successfully provided the water volume is high.

Follow bracken control with appropriate site preparation (see section 4.0).

5.4 Kikuyu Grass

Total-spray Roundup at 4l/ha (Sheet B3) in summer when grass is actively growing. Burn at the break of season if lead time permits.

Cultivate to break up soil clods and then mound (see section 3.1). Strip-spray with K/R mix at least 1 month prior to planting (Sheet B20).

5.5 Knockdown/Residual (K/R) Spray Prior To Planting

NOTE - Gesatop is extremely viscous and requires thorough mixing and then continual agitation during spraying. Poor mixing and agitation will produce high concentrations at first, followed by lower than prescribed concentrations from then on.

Light dry soils (white leached sand) with very low organic content

Spray Roundup at 1-4 l/ha plus Gesatop at 10 l/ha (Sheet B20). Use lower rate of Roundup where capeweed predominates and/or weeds are newly emerged (2 leaf stage). The rate of Roundup should be increased as weeds mature or when clover predominates. Add "Boost" to the tank mix at 2% v/v or w/v.

Loamy sand and heavier soils

Spray Roundup at 1-4 l/ha (as per 4.5 Light dry soils) plus Gesatop 10 l/ha. (Sheet B20).

Soils with very high organic content (organic podzols)

As most soils fitting this description will be waterlogged for a period during winter and spring, mounding is essential. Allow at least one month for mounds to settle before spraying with a mixture of Roundup at 1-4 l/ha (see 5.5 Light dry soils) and Gesatop at 16 l/ha (Sheet B20).

5.6 Timing of Application

Lead Time Between Mounding and Spraying

Allow one month between mounding and spraying to enable the mound to settle, and to allow any buried weeds to emerge prior to the K/R spray if spraying was not done before mounding.

For Best Weed Control

For prolonged residual activity, residual herbicides are best sprayed onto as bare a soil as possible. Consequently it is desirable to graze paddocks heavily before spraying.

Herbicides must not be sprayed onto inundated soils, as they are subject to cross-surface flow of water.

Knockdown herbicides should not be applied when plants are stressed.

Lead Time Between Spraying and Planting

Planting must not commence within the following periods after herbicide application:

Brush Off - 28 days @ 20g/ha

- 56 days @ 50g/ha

Roundup/Gesatop mixtures - 28 days and at least 50mm of rainfall.

Roundup - 7 days

6.0 FERTILISER

There is little or no benefit in fertilising seedlings if weed control is not successful.

If successful weed control is assured, then seedlings should be fertilised at the time of planting or within 4 weeks of planting. Poor pastures, where residual P is below 15 ppm, should be fertilised with 50 g of diammonium phosphate (D.A.P.); better pastures, where residual P is above 15 ppm, should be fertilised with 50 g Agras Number 1.

Fertiliser should be buried 15-20cm from the base of seedlings with a planting spear or potti-putki.

7.0 PRIORITY OF PREPARATION AND PLANTING

Ideally, all seedlings should be planted as early in the season as possible. However, planting operations should be prioritised in the following order:

1. Southern Coastal Plain (Black Point) - plant early in the season before waterlogging makes access a problem.

2. Sandy dunes in the Swan Coastal Plain and Albany area - plant early to ensure roots have maximum possible opportunity to develop at depth before summer. Planting must be completed by July 31.

3. Sandy lateritic ridges in Central Hills and Wellington Catchment - plant early to ensure maximum growth before summer drying. Planting must be completed by July 31.

4. Low-rainfall cells ahead of high-rainfall cells.

5. Light-textured sands ahead of heavy-textured loams.

8.0 PEST CONTROL

Refer to Plantation Pest Manual (in preparation).

Rabbits

APB control in Jan, Feb, March using oats 1080 baited oats

Black Beetle

The best control against black beetle is to retain unsprayed grass strips between planting lines to give them something else to eat.

Cutworm/Grubs

Control with Sumiciden 75 (75g/l Fenvalerate). Follow the label instructions.

Grasshoppers

Nymphs: spray with Malathion ULV Concentrate as the label directs (500ml/ha). Spray must be applied with a ground mister.

Adults: spray as for nymphs and/or bait with a combination of 1 kg Carbaryl 80 + 40 kg chick starter pellets + 2l water + 4g methocel mixed together in concrete mixer. Spread at 3 kg/ha in a 50-100 m wide barrier zone around plantation.

Other Insects

Contact CALM entomologists Ian Abbott (Como Research) or Janet Farr (Manjimup Research).

Another avenue of advice is via the Agriculture Department entomologists who may be familiar with local insect problems and the control mechanisms. They include Mike Grimm (Albany) and Stewart Learmonth (Manjimup).

All recommended insecticides must be approved for CALM use via Safety Branch, who will arrange permission from the Dept. of Health and prepare a CLM 729.

The Manager of Silviculture Branch should be informed of all broadscale applications of insecticide. In addition, insect problems in plantations should be fully documented (with the date, insect type, damage, area affected, tree species affected, weather conditions, insecticide used, rate used, method of application, degree of success and any other useful information) and forwarded, along with samples of insects, to Forest Entomology in Como.

9.0 SURVIVAL COUNTS and RE-ESTABLISHMENT

Reconnaissances of all properties should be carried out in late Spring/early Summer to enable estimates to be made of infill numbers required for the following season. Seedling orders for re-establishment are required at the nursery no later than 15th December of each year.

Re-establishment should be carried out in:

- broadscale failed areas of 1 ha or greater;

- areas of 1 ha or greater where survival/stocking density is less than 50% of the nominal stocking. Surviving stems should be discarded and areas should be totally replanted. Chemical rates for re-establishment should be as in section 5.0.

Treated areas should be accurately mapped and documented.

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