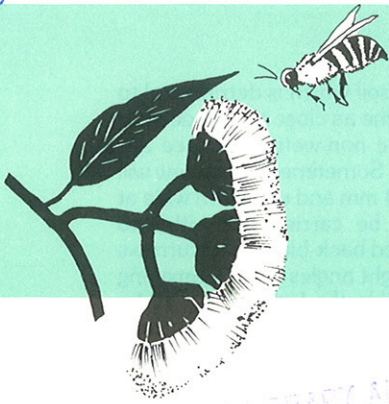


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Information Sheet No. 3-87

Department of
Conservation and
Land Management
Reprinted October 1990

Tree Planter's Guide

Introduction

Trees are an essential part of our environment. In rural areas trees provide beauty, shade, shelter belts, erosion control, as well as alleviating waterlogging, controlling salinity and conserving wildlife.

Many farmers are now planting trees to reap some of these benefits. It is important not to plant too many seedlings at a first attempt and neglect preparation, fencing or after-care. The result is a low survival rate and disenchantment for future plantings.

CALM advisory officers and farmers share a common interest in wanting to see more trees in the rural environment. We urge you to pay attention to the details outlined below and take on a tree planting program that is manageable but continues to expand over the years.

Planning a Tree Planting Program

Prior to any tree planting program, draw up a farm plan with the assistance of your local Department of Agriculture advisor.

On an aerial photograph or plan the following areas should be marked:

1. Erosion prone areas.
2. Non-wetting surface soils.
3. Seasonally flooded areas.
4. Seepage areas.
5. Saline areas.
6. Areas of tree decline.
7. Non-productive areas.
8. Existing native vegetation.

Within these boundaries mark areas requiring urgent treatment and allocate priorities.

A realistic budget should then be prepared that covers a yearly number of trees that can be planted, protected and maintained to give maximum survival. There is nothing to be gained from a large scale program if half the trees are lost through lack of maintenance. If in doubt seek advice and discuss the selection of appropriate species for particular requirements.

Before planting trees carry out major alterations, such as relocation of fencing, drainage lines, contour banks, which may conflict with or alter the program. You will also need to take account of the direction of prevailing winds and other environmental factors.

Selecting the Right Tree

When selecting species consider the purpose for which the trees are being planted. If trees are to be grown in salt prone areas, plant salt tolerant species. Shelterbelts require trees with foliage close to the ground. Alternatively, trees of various heights will provide the same effect. The Department of Conservation and Land Management (CALM) publishes a leaflet called 'Trees for Agricultural Areas' which gives rainfall requirements, tree heights, preferred soil types, a description of the tree and its recommended use. This pamphlet is available from all CALM offices and is a useful guide for tree selection.

Before introducing trees to an area, examine the potential of the local species. These trees have developed under the climatic conditions of the areas and, providing they are considered suitable for the purpose, are the obvious choice. Frequently, the local species are not considered because their rate of growth is slow. While this is so with some species, most native trees grown under cultivated conditions, where competition is excluded and some fertiliser is applied, respond with a much faster rate of growth.

Where the local species do not satisfy the requirements then select from trees occurring in similar soil types and growing under identical or lower rainfalls. If it is decided to introduce species more tolerant to drought than the existing native trees, make a selection from trees which grow in lower rainfall zones.

Careful consideration also needs to be given to the selection of trees for town sites. Large trees in confined spaces or under powerlines require regular pruning which, as well as being costly, is detrimental to the health, longevity and appearance of the tree. In these situations trees of lower stature will furnish good shade and are far less costly to maintain. In areas of unrestricted space, large trees can be planted to provide height and effective landscaping.

Ordering Trees

Once you know the desired species and number required, order the trees. Most nurseries seed their trees in the November-December months for sale the following winter. If orders, particularly large ones, are placed around seeding time the order can be filled. The longer ordering is delayed the lower the chance of obtaining the desired species, particularly in large numbers.

Size of Stock

The 7-8 month seedling is ideal for establishment under natural rainfall or lower watering regimes. Most farm tree nurseries supply this type of seedling. Under natural conditions trees establish themselves by first developing a deep root system to tap the moisture. The larger the tree the less chance it has to develop an adequate root system. In addition, the larger foliage area of such 'advanced stock' places greater moisture stress on the plant, and the chance of successful establishment without frequent watering is minimal.

Another problem with advanced eucalypt stock is that the tap root will coil if left in a container too long. After planting the tree grows and the roots thicken. A restriction develops which can result in a severe setback or even strangulation of the tree. It can also make the tree prone to windthrow.

Preparing the Site

1. Mechanical Weed Control

Weed control is essential to avoid competition with the young plants in the first year following planting. Grade the top 5-7 cm of top soil, which contains the

weed seeds, to one side, after the weed seeds have been shed and prior to ripping.

2. Ripping

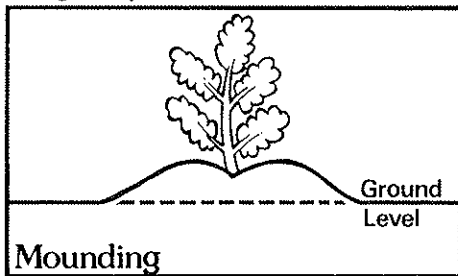
Ripping is essential in heavy soils and is strongly recommended for all planting sites, even sand. The depth of ripping is dependent on machinery, but should be to a minimum of 450 mm and preferably to 1 m. If possible rip during the summer months.

At least one but preferably three lines are ripped for each row of trees, and the trees are planted in the centre ripline. In sandy soils a single ripline will suffice. Multiple riplines should be spaced the depth of penetration apart.

Ripping should be on the contour, but if ripping has to be carried out down a slope, lift the ripper at various stages, depending on slope. Alternatively, rip and cross rip at the point of planting to prevent moisture running to the end of the row or erosion will occur. Ripping will more than compensate for the added cost by providing faster and healthier growth and reducing the need for summer watering.

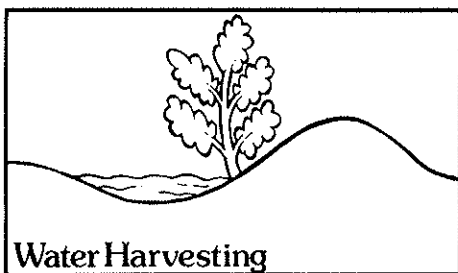
3. Mounding

In low-lying wet areas, where flooding can be a problem by the end of winter, early planting is not advisable as young trees in saturated soils will die. Ripping followed by mounding to raise the soil above the saturation level is necessary. The mounds can be made by using two opposing discs or a blade. In saline areas it is preferable to spread the discs to form a mound with a dished centre. The dished centre will concentrate the winter rains and increase the leaching of any salts.



4. Water Harvesting

In areas of low rainfall water harvesting techniques will accumulate rainfall and enhance the chances of establishment. One method is to grade the surface soil along the contour, at an angle, pushing the soil into an embankment. Water will pond behind this bank, and if the trees are planted in the riplines on the slope at the margin of the ponded water the chance of successful establishment is increased.

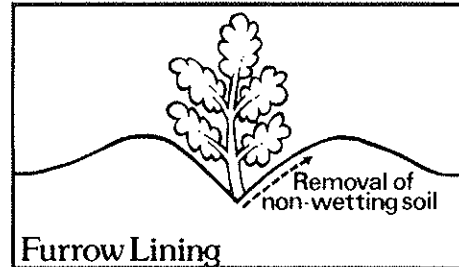


Pitting, another water harvesting technique, is an abbreviated form of furrow-lining. Individual niches approximately 2 m long and 1 m wide are made for each tree. The niche will accumulate water and the tree is planted at the bottom of the niche. Again, riplines should precede pitting.

5. Furrow-Lining

Some sandy soils particularly old pastured sites have

a water repellent surface soil which is detrimental to tree establishment. A ripline as close to 1 m deep as possible is made, and the non-wetting surface soil removed by furrow-lining. Sometimes this furrow will need to be as deep as 300 mm and up to 1 m wide at the top. The work can be carried out with two opposing discs or an angled back-blade. The furrows should preferably be at right angles to the damaging winds. If this is not possible the furrows should be broken at intervals and a barrier of lupins or crop planted to alleviate erosion problems. The planting of crops between furrows will also help to protect against erosion on susceptible sites.



6. Chemical Weed Control

The herbicide rates recommended below are applicable to most areas, however, care should be taken on sandy soils in low rainfall areas where problems with burning can arise. Herbicides should be applied four weeks prior to planting.

- (a) Dry soils (mid-slope to ridge top): Pre-planting spray of amitrole (0.5 to 1.0 kg/ha active ingredient) mixed with atrazine (2.5 kg/ha active ingredient). Output should be between 150 and 250 L/ha, applied in a swath 1.5 m wide. The lower rate of amitrole should be used when weeds are below 5 cm in height and the higher rate when weeds are above 15 cm in height.
- (b) Moist Sites (lower slopes and river flats): Apply the same treatment except lift the rate of atrazine to 3.5 kg/ha active ingredient. Note: the swath width should be extended to 2 m where tall weeds occur, e.g. wild radish.
- (c) Control of perennial weeds (all sites): Pre-plant spray of a mixture of Roundup® (use label recommendation for specific weed species) and atrazine (3.5 kg/ha active ingredient). Add ammonium sulphate to the atrazine at 2 per cent weight/volume adding the Roundup® subsequently to this mixture. Output should be below 100 L/ha and swath width as prescribed earlier.

Handling Seedlings

Open-rooted trees are those lifted from nursery beds without soil around the roots. The handling of these plants is critical since the roots can readily dry and the seedlings die. Whether pine trees, or other species, the handling procedure is the same.

Open-rooted plants are machine lifted in the nurseries and immediately packed in wet bags before the roots can dry. They are then watered prior to being picked up or consigned.

The first stage where plants can dry is during transportation on the back of open vehicles. Plants should be transported either in covered vehicles or else the bags and plants wrapped in plastic to protect against the wind.

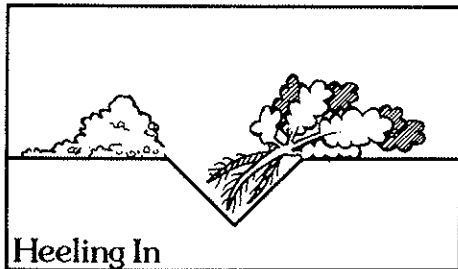
On arrival bundles of pines should be placed in a shady position out of the wind and well watered. Excess water from this should seep out through the bagging. Trees in pots should be straightened in the tray, placed in a sheltered position and thoroughly watered.

Plants should be planted as soon as possible. If open-rooted pines have to be held for longer than two or three days the bags can be dug into the ground to protect the roots from drying in the wind and watered regularly. It is preferable, however, to heel the pines in a sandy protected site near a watering point.

Heeling In

Pick a clear site, remove any weed cover and open a trench at an angle of approximately 45°. Place the pines three or four plants thick along this trench and refill with the sand. Water heavily with a hose to force sand among the roots and eliminate air pockets. Water the plants regularly.

Plants can be held like this for lengthy periods of time, then removed and planted as required.



Planting

1. Timing

Planting time will differ between areas, but it should be finished by the middle of July unless the area is very wet. In areas of reliable winter rains, planting should take place once initial rains have penetrated the soil profile and follow up rains can be reasonably assured. This gives the plant time to establish itself prior to the cessation of the winter rains.

In drought areas, where rainfall is unpredictable, planting should be carried out in the cooler months. The soil will need a good watering prior to planting, and subsequent waterings until such time as reasonable rainfall is received or the trees have established.

In drought areas where watering has to be maintained for some time it is particularly important that planting programs are manageable.

In low-lying wet areas, where flooding can be a problem by the end of winter, early planting is not advisable as young trees in saturated soil will die. In these locations mound the soil above the water, and plant the trees on the mounds. Alternatively, wait until the water level has dropped below the soil surface.

2. Planting Techniques

Nursery Potted Stock:

1. A hole, sufficient to accommodate the teased root system, should be dug in the prepared moist ground.
2. Place your fingers either side of the tree, invert the pot and tap the edge firmly on a solid object. The plant will slide easily out of the pot.
3. Gently tease the side and basal roots until they hang loosely. If the tap root springs back into coil, remove it with a pair of secateurs.
4. Position the plant in the centre of the hole at a depth 10-20 mm deeper than it was in the container. Be careful not to turn the roots upward or allow them to coil.
5. Fill the loosened soil gradually back into the hole and firm, using your feet.
6. Build a saucer around the plant using soil away from the tree.

3. Hand Planting Jiffy Pots

It is important to completely saturate the plant prior to planting. If the peat surrounding the plant roots dries out root penetration will be restricted.

Prior to planting remove the peat at the base of the jiffy pot and tease the roots in the bottom 10 mm of soil downwards. Then plant as for potted stock. Keep the peat rims of the pot beneath the surface soil level, otherwise the peat, if exposed to the air, will act as a wick and dry the pot and soil.

4. Machine Planting Potted and Jiffy Pot Stock

Large scale planting is generally carried out using planting machines. There are a number of these machines manufactured by different firms and offered for sale or hire. The working principles of the various machines are similar, but the prices vary according to modifications for comfort and efficiency of operation. It is important with machine planting to ensure that:

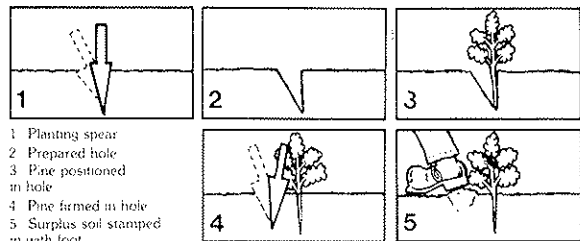
1. Weed control and soil preparation have been properly carried out;
2. Non-wetting surface soils have been removed;
3. The trees are planted into a moist soil;
4. The trees are planted with the roots down and not bent upwards or horizontal during planting; and
5. The firming wheels are working efficiently and consolidating the soil around the plant.

5. Planting of Open-Rooted Stock by Hand

Trees should be planted early in the season (June) provided the soil profile is wet. Trees should be planted to a depth between 6 and 8 cm below nursery level. Planting after the end of July is not advisable.

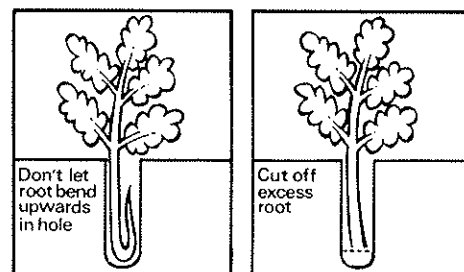
It is important that where water repellent soils are a problem that furrow-lining (described earlier) is carried out so that the roots are in moist soil.

Planting Procedure:



During planting never allow the roots to dry, and do not carry a handful of plants with the roots exposed. Remove plants individually from wet sacking or a plastic bag. A small amount of water can be held in a plastic bag to ensure wetting of the roots.

Note: If the pine tap roots are excessively long, so that they bend upwards when positioned in the hole, the excess should be cut. This can be done with secateurs or by levelling the roots of a small bundle and cutting off the excess with a sharp tomahawk or axe.



6. Planting of Open-Rooted Stock by Machine

Weed control, ripping and furrow-lining (if required) should be carried out prior to planting. When planting it is important that the roots of the pines are vertical. The plant roots must be kept moist at all times and the compacting wheels positioned to obtain maximum firming of the soil around the plant.

7. Tamarisk Cuttings

Tamarisk trees are ideally suited for windbreaks, particularly in the sandy soils around Geraldton. These trees can be started cheaply by the direct planting of cuttings.

Firstly, create a weed-free strip 2 m wide by blading off the top 5 cm or by the use of Roundup® or other non-residual sprays. Cuttings are then prepared from the current season's vigorous growth. The thickness of the cutting is not crucial, but a range of 10-20 mm at the thickest end is ideal. Cut 450 mm lengths, using sharp secateurs, or saws for the thickest cuttings, then place between moist bags. The cuttings can be treated with a root-inducing hormone but this is not essential.

The tractor then proceeds along the prepared line pulling a ripper penetrating to approximately 375 mm. The planter walks behind the tractor pushing three cuttings (50 mm apart) the full depth of the ripline every 5 m along the ripline. At the end of the line the tractor runs back along the line, with the back wheel 175 mm from the cuttings, firming the ground. The same procedure is used on the opposite side of the planted line.

The cuttings should be planted in June, and not later than the middle of July.

Weeds should be kept away from the cuttings during the first summer, and if the summer is dry monthly watering will be necessary until the winter rains begin.

Maintaining Trees after Planting

1. Protecting

Trees must be protected from stock, therefore, either fences or protective guards are essential. Rabbits must also be controlled.

It is suggested that tree planting programs be carried out in conjunction with fence replacement, i.e. leave the old fence in place and erect a new one to form a laneway for trees.

In areas prone to grasshopper attack follow the control methods detailed in the Agriculture Department's farm note 'Wingless Grasshoppers and their control'.

2. Controlling Weeds

Providing initial weed control is effective into the first summer after planting and trees are growing, no follow-up weed control is necessary.

If weed control is not adequate into the first summer, however, additional spraying will be necessary. There are three options:

1. Pines (not Eucalypts) can be resprayed over the trees with amitrole and atrazine (not Roundup®) at the rates prescribed in sections 6(a) and (b). Some toad damage may occur once the trees begin to actively grow (spring) so spray as soon as the problem shows itself in late winter.
2. Two herbicides Fusilade® and Certin® can be sprayed directly over newly planted trees and are useful for eradicating most grasses, but will not control broad-leaved weeds. If these herbicides are used where broad-leaved weeds are also present the latter will proliferate and fill the openings left by grasses, causing further prob-

3. Systemic sprays such as Roundup® present no problems providing the trees are covered. The plants can be protected by using short lengths of 100mm diameter plastic piping with the top covered with a small plastic bag. Place these over a number of trees, spray, and then move the covers to another set of trees. Alternatively, use a protective guard (such as an empty icecream container) over the spray nozzle to contain the spray.

3. Fertilising

The addition of a fertiliser two weeks after planting promotes faster growth and increases the drought resistance of a tree.

All fertilisers, in particular nitrogen-based fertilisers, can be damaging to plants and must be applied according to instructions, on the container for commercial slow-release fertilisers, and as outlined below.

At the time of planting slow-release fertilisers such as Agriform tablets and Osmocote can be used to advantage because the chances of damage to the plant are minimal. Commercial fertilisers can be compressed and made into slow-release tablets at a low cost. The tablets can be made any size, and the recommended application of one handful is equivalent to 60 g.

Potato Manure E is suitable and is not damaging to the plant if applied at the rate of one handful per tree, scattered around the base or else placed in a hole, on the downward slope, 150 mm from the trunk of the tree and at a similar depth in the soil.

Agras No. 1 or No. 2 at a similar rate and speared into the soil as just mentioned, is used by the Department of CALM for eucalypt tree establishment.

Pine trees require only superphosphate which is applied at a similar rate and manner to other fertilisers. Where the soils are known to be deficient in copper and zinc, a super copper zinc mixture is used.

Repeat fertiliser applications the following year will further increase the health and growth of the trees.

4. Watering

It is difficult to specify the watering needs of a plant since factors such as rainfall (timing and quantity), soil type, temperature, drying winds, plant size and water quality will control the need or frequency of watering. During years of normal rainfall, in moisture retentive soils, and where the rainfall is above 500 mm, trees can be established under natural rainfall conditions providing soil preparation and weed control have been effectively carried out. In poor sandy soils of the same rainfall, and in all soil types of lower rainfall, watering during the first summer may be necessary. This is impossible with large scale planting, and in these situations farmers must be prepared to accept a higher proportion of losses rather than the work involved in extensive watering programmes. In dry areas supplementary watering during the first summer will ensure a higher success rate and faster initial growth.

As a general guide, water should be applied in heavy, widely spaced applications rather than light, frequent ones, which tend to create a surface root system. Where the salinity level of the water is relatively high, the accumulation of salts in the upper soil profile can be avoided by infrequent, but deeply penetrating waterings.

Compiled by CALM Advisory Service
Further information is available from advisers based at Como, Narrogin, Geraldton and Esperance offices of the Department.