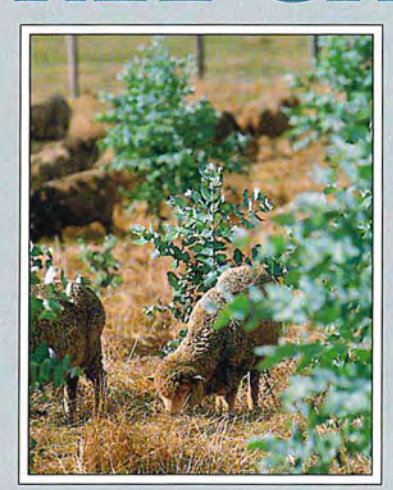
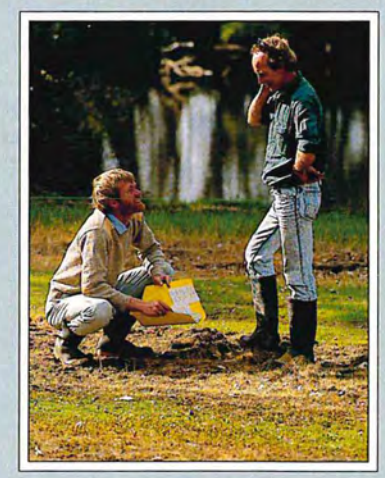
TREE CROPS FOR PROFIT





THE TIMBERBELT SHAREFARMING PROJECT 1990

Department of Conservation and Land Management

In 1988 the Department of Conservation and Land Management (CALM) successfully applied to the National Afforestation Program (administered by the Department of Primary Industries and Energy) to fund a project called 'The integration of short-rotation eucalypts into agricultural systems in the south-west of Western Australia'. The Department of Agriculture and the Water Authority of WA were partners in the project, which was managed by CALM and conducted by a project team.

Bob Pearce: Minister for the Environment

"The Government is delighted to see the progress being made with the timberbelt tree planting concept. It offers the promise of a profitable new farm crop as well as the potential to control land and water degradation in the lower south west.

"The assistance given to the State by the Commonwealth Department of Primary Industries and Energy, under its National Afforestation Program, has been crucial to the success of this development."

Syd Shea: CALM Executive Director.

Syd has had a long-standing interest in the rehabilitation of degraded forests and farmland and has given the project strong direction and support within CALM.

John Bartle: CALM Principal Research Scientist.

John has been involved with the selection of tree species and development of tree crops for salinity control for the past decade. He planned and supervised the project.

Bruce Mattinson: CALM Research Economist.

The agricultural economist on the project team, Bruce developed a practical, integrated tree planting system which would be attractive to farmers as well as acceptable to potential investors.

Gavin Ellis: CALM Research Scientist.

Gavin was the project forester whose role was to develop establishment and management practices for fast-growing eucalypt crops.

Richard Silberstein: CALM Research Scientist.

Richard was the project hydrologist who helped design tree crop layouts for farms and established experimental catchments where the water quality benefits of tree crops will be accurately measured.

The Water Authority of WA and the Department of Agriculture were partners in the project and provided critical review of progress.

Water Authority of Western Australia

WESTERN AUSTRALIAN DEPARTMENT OF AGRICULTURE

THE NEED TO INTEGRATE

In Western Australia, agriculture is achieving impressive levels of production in a difficult natural environment. However, its development as a stable system is not yet complete. The present, almost exclusive use of shallow-rooted annual crops and pastures has created an agricultural system which cannot completely consume all of the rainfall which enters the soil. This surplus water causes the major land and water degradation problems which blight agriculture in this State.

Our system of agriculture urgently needs a range of perennial plants which have good water use and which are, ideally, economically competitive with other agricultural options.

In the last decade, progress has been made in developing economic tree crops suitable for areas wetter than 600 mm rainfall. Fast-growing eucalypt species, in particular the Tasmanian bluegum (*Eucalyptus globulus*), were found to produce promising yields of pulpwood over short rotations, and have high transpiration rates.

Agroforestry research work revealed the potential for integration of tree crops into farming. The combination of tree crops with agriculture was shown to give greater total value of production than either single-purpose plantation or single-purpose agriculture. This effect stems from better use of available water and nutrients, and the benefits of shade and shelter.

The challenge is to achieve a combination of tree crops and conventional agriculture which is profitable, can be funded, and is attractive to the majority of farmers. This was the objective of the Timberbelt Sharefarming Project managed by CALM and funded under the National Afforestation Program.

Trees planted to stop salinity spreading and to protect remnant vegetation.

TIMBERBELT SHAREFARMING:
THE CONCEPT

The Timberbelt Sharefarming Project set out to demonstrate that short rotation pulpwood eucalypts need not be planted only in plantations. Trees were planted in long belts, in blocks above seepages, bands around degraded remnant vegetation and on soils prone to erosion. The plantings were designed to complement agricultural production on the farm, while at the same time achieving environmental benefits off the farm.

The project does not have a minimum area requirement. The fixed costs of operating on a farm are explicitly written into the agreement with the farmer. Hence a farmer who requires only a few hectares has a higher fixed cost per hectare than a farmer who requires 40 hectares. The return to CALM is not affected by size.

In timberbelt sharefarming, CALM's involvement is in the first year only (the establishment phase). For the project, this involves assessing a site for its suitability to grow trees, and the likely benefit to the farm and environment from the proposed tree establishment. With the farmer's active assistance, the site is then ripped, weeds controlled using herbicides, seedlings planted and fertiliser applied. Except for the tractor and the farmer's labour, CALM supplies resources and pays for the establishment costs.

The farmer's contribution is to supply and erect fences, poison rabbits and control insects over the first summer. The farmer is also responsible for firebreaks and for fertilising the trees three times before harvest.

An exchange of letters is used to legally secure the interests of both the Department of Conservation and Land Management and the farmer.

At the first harvest, both CALM and the farmer recover their costs, plus compound interest. Once these costs are deducted, the balance - or profit - is split evenly between CALM and the farmer.

Obviously the profit is affected by the size of the first rotation harvest revenue, this being determined by the trees' growth rate and the price for pulpwood. The farmer's and CALM's profits are each anticipated to be between $2000 and $4000 per hectare, in today's money terms.

After the first rotation, the trees reshoot (coppice) from the stump. The coppice grows quickly, within a year reaching about three metres in height. CALM's commercial interest ends with the first harvest. The farmer owns the second and subsequent harvests.

Trees planted along a valley bottom.

TIMBERBELT SHAREFARMING:
THE ACHIEVEMENT

Timberbelt sharefarming was launched in January 1990 in both Darkan and Albany in the south west of Western Australia. Trees were planted on 64 farms and covered 950 hectares. While most farmers chose the standard Timberbelt Sharefarming agreement, about 15 per cent chose to go-it-alone and own 100 per cent of the harvest revenue.

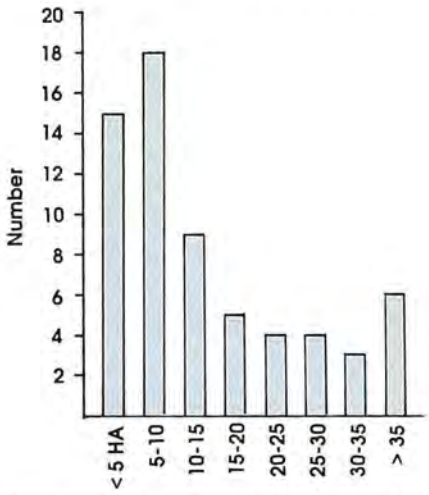
The area planted with trees ranged from as little as three hectares on one property, to six properties which opted for the maximum area of 40 hectares.

The major benefits of planting trees which appealed to farmers were the control of salinity, wind erosion and shelter.

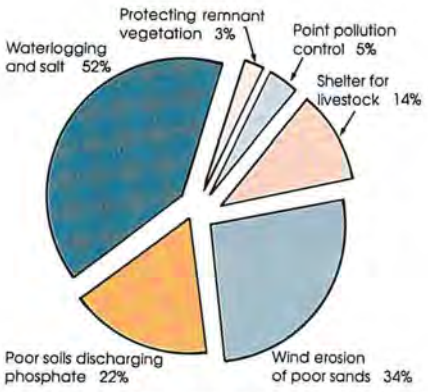
More than 900,000 seedlings of 14 different eucalypt and acacia species were used in the 1990 Timberbelt Sharefarming Project.

Even before the 1990 plantings have had time to take root, 14 farmers from the 1990 project have indicated they will be involved with further plantings in 1991, and inquiries from neighbours who want to join are mounting.

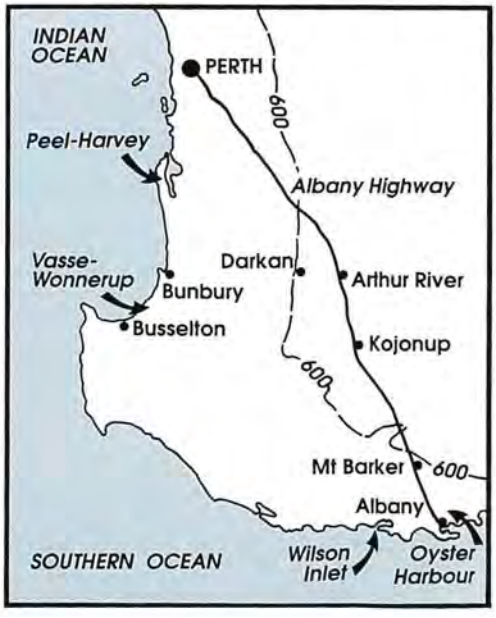
Foliage of Tasmanian bluegum (Eucalyptus globulus).



Number of Properties in each Size Class



Primary on the Farm Reason for Tree Planting



TIMBERBELT SHAREFARMING: *WORKING FOR FARMS*

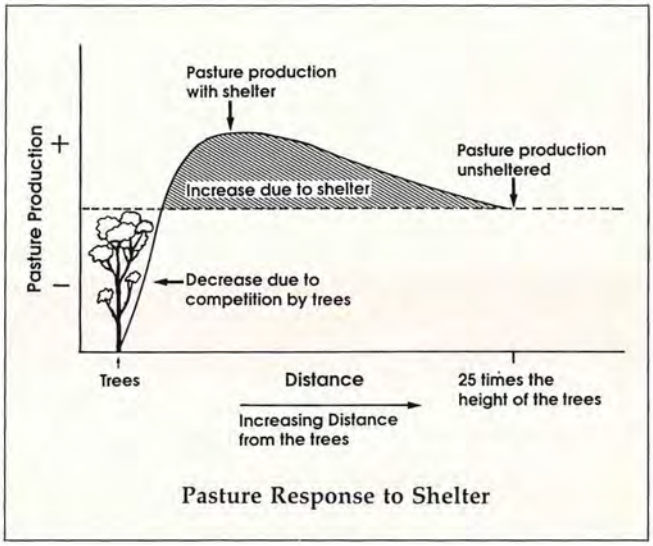
Pulpwood eucalypts are an economically competitive crop and farmers are attracted to them for the single purpose of farm profit.

However, with careful planning, timberbelts can be arranged so they bring many other benefits to the farm and the farm business. These have been called non-wood, or secondary, benefits. The major ones are:

- shade and shelter
- control of waterlogging and salinity
- erosion control

Additional benefits gained from timberbelts include:

- farm business diversification
- aesthetics
- habitat



Pasture Response to Shelter

SHELTER

Farmers are recognising the value of shelter for both their pastures and livestock. In many of the 1990 plantings, the primary purpose is shelter for pastures and livestock.

Pasture and crop production in the lee of a timberbelt is enhanced over a distance of 25 times the height of the trees. The trees reduce wind speed, buffeting, and water requirements for plants.

During severe weather, unsheltered livestock are exposed to the chilling effect of wind; providing shelter during this time can cut an animal's energy requirement by half. The impact of providing shelter is graphically demonstrated by the reduction in lamb deaths and losses of shorn sheep in paddocks which have adequate shelter.

Trees planted along fence lines, providing shelter for pastures and livestock.

TIMBERBELT SHAREFARMING: *WORKING FOR FARMS*

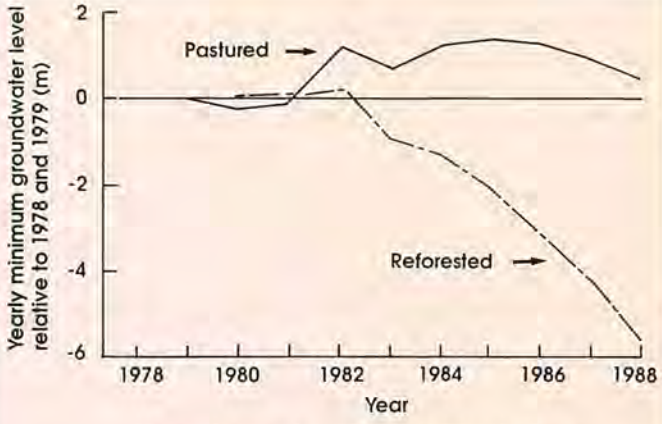
SALT

Where groundwater reaches the soil surface, a saline, waterlogged area called a salt seep occurs. Where groundwater lies within two metres of the soil surface, upward movement of water and salt by capillary action can damage soils and reduce pasture production. These areas of groundwater discharge occur low in the agricultural landscape and may affect up to 15 per cent of some farms in the 600-700 mm rainfall zone.

Recharge (or infiltration) into groundwater systems can occur throughout the rest of the landscape. The patterns of recharge and the movement of groundwater downslope can be complex. The objective in using timberbelts to control salinity is to place them where they will most efficiently intercept groundwater. This will achieve the dual purpose of greater reduction of pressure in the downslope discharge area, and greater availability of water for wood production. Two target planting locations can be defined:

- the lower slope margins of areas of deep permeable soils into which water and tree root penetration should occur most freely
- the lower slope areas where the deep groundwater system comes within two to five metres of the soil surface

These plantings should be augmented by widespread planting of salt-tolerant species across the discharge areas as a backstop. The whole timberbelt system should be designed to ultimately reduce the groundwater level below the critical two metres depth over the whole of the discharge area.



Groundwater drawdown at Stene's farm in the Wellington Catchment

Skilful interpretation of landform, soils and remnant native vegetation can be used to delineate the various planting locations.

Ongoing water table monitoring

As part of the long-term understanding of the role trees play in reducing water tables, the Timberbelt Sharefarming Project and the Department of Agriculture drilled 34 bore holes to monitor groundwater.

Such bore holes can be used to observe the change in groundwater levels over time. Farmers can easily do this monitoring themselves and keep track of how effective their management is in controlling groundwater.

TIMBERBELT SHAREFARMING:
WORKING FOR FARMS

WIND EROSION CONTROL

Soils with a sandy surface occur commonly in the south west. In some areas sandy soils occur in isolated pockets. This sand was deposited in dunes or against the side of hills. Being small areas of sand in otherwise productive agricultural land, they have presented a management problem for farmers. On the coastal plain, the sandy soils may be more extensive. During summer, sheep prefer to congregate on any light sandy areas. The disturbance caused to the surface by sheep makes these sand areas vulnerable to wind erosion.

Farmers quickly seized the opportunity offered by the Timberbelt Sharefarming Project to plant trees on the pockets of sand. The tree planting provided an economic incentive to fence out the sand from the surrounding productive farmland. With trees protecting the surface from wind, the risk of wind erosion is reduced.

With modest application of fertiliser, the tree growth on sandy soils is expected to be good. In most cases the trees will have access to large quantities of sub-surface moisture.

GREENHOUSE CORPS

In keeping with the philosophy of integrating trees into the farming community, a cooperative work experience program was started with the newly established Greenhouse Corps.

Three of the five field supervisors in the Timberbelt Sharefarming Project are graduates of an advanced farm planning and landscape course run by the Greenhouse Corps.

The bulk of the planting was done by a team of 11 previously unemployed people from Mt Barker. The Greenhouse Corps provided training for these people, both before and after the tree planting.

Greenhouse Corps trainee planting in the field.

THE ENVIRONMENTAL BENEFITS

EUTROPHICATION

Eutrophication is the nutrient enrichment of water bodies. It may just cause a nuisance growth of algae, or it may lead to severe ecological decline.

Eutrophication occurs commonly in the water bodies of the coastal plains of the south west. The Peel-Harvey Estuary at Mandurah, Vasse-Wonnerup Estuary at Busselton, Wilson Inlet at Denmark, and Oyster Harbour at Albany are the most severely affected. The source of much of these nutrients is farmland.

The coastal plains and the catchments of the King and Kalgan Rivers near Albany have sedimentary parent rocks which give rise to some soils of outstanding infertility. These soils require generous fertiliser application, and their nutrients, including phosphorus, leach readily into drainage water.

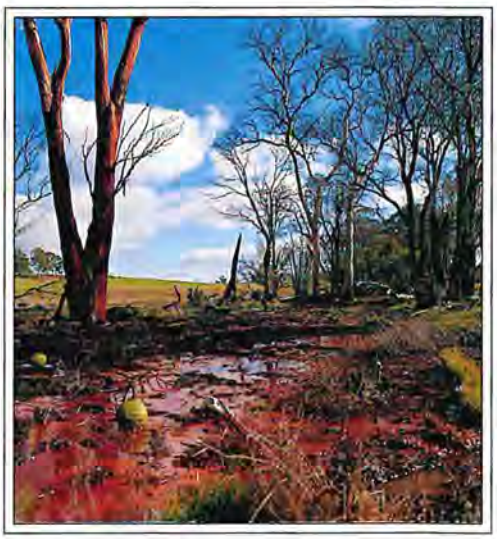
Unlike salinity, nutrient loss does not cause any on-farm damage. However, the nutrients and the water transporting them are resources the farmer has lost the opportunity to use. Timberbelt plantings give the farmer a chance to reduce this loss, as well as helping to clean up an environmental problem.

SALINITY

Salt discharged from farmland finds its way into wetlands, streams and rivers. This process has extensively degraded wetland and riverine ecosystems and rendered half of the south west's previously fresh water resources unusable.

Short rivers, with a small proportion of farmed catchment and with rainfall mostly greater than 600 mm, have been only partly degraded. These catchments are considered recoverable as fresh water resources - if appropriate farming practices such as timberbelt tree planting are extensively adopted. Examples of these include the Collie, Warren, Kent and Denmark River catchments. These catchments have been given particular priority in the promotion of timberbelts because of the long-term community benefits that can be gained.

Another area for timberbelts to be promoted is in the catchments of the few remaining freshwater lakes that occur in farmland in the area between Mt Barker and Lake Muir.



Land and stream degradation due to salinity.

THE ENVIRONMENTAL BENEFITS

REMNANT VEGETATION PROTECTION

It is now widely acknowledged that the removal of native vegetation from farms was overdone and many farmers are now keen to protect what little they have left. In the Albany and Plantagenet Shires, only 10 per cent and five per cent respectively of the average farm area remains under native vegetation, and much of this is dispersed in small pockets. The exposure of this remnant native vegetation to the full force of the elements, and to grazing, fertilisation, weed and vermin invasion, pest and disease attack, and in lower topographic areas to groundwater inundation, has severely compromised its viability. In many areas, processes of decline are well entrenched.

Remnant native vegetation can be incorporated into timberbelt plantings and protected from some of the destructive influences of the open farm. Timberbelt plantings provide an economic incentive for erection of fencing, which will further enhance the rejuvenation of remnants. Furthermore, timberbelts can be used to link isolated remnants into networks to provide protected corridors for wildlife movement. The extensive adoption of these practices would be of major nature conservation benefit.

Remnant vegetation protected by tree planting.

THE ENVIRONMENTAL BENEFITS

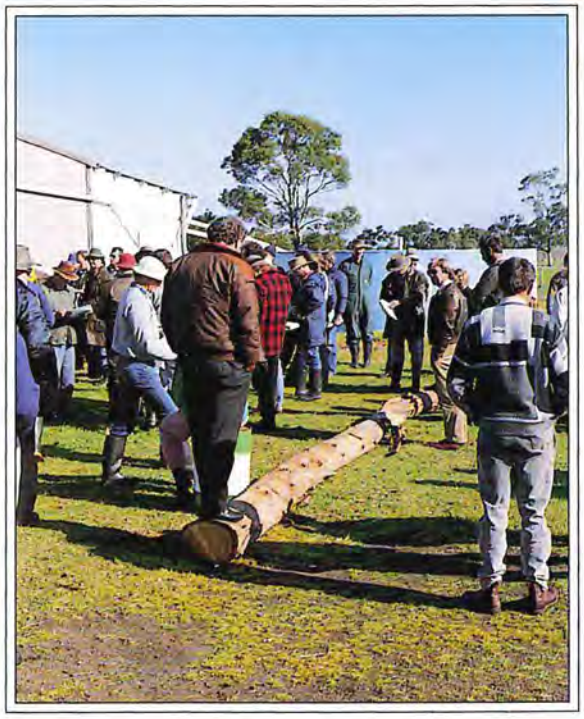
THE LANDCORP PROJECT

As part of CALM's integrated tree planting project, LandCorp provided $50,000 for the planting of trees on four properties. Eighty-four hectares of trees have been planted as part of the LandCorp project.

One of the properties is within the Lake Towerrinning catchment. This planting was used to help reduce the level of salt entering this lake and encourage farmers to use trees to protect the lake.

Two of the LandCorp plantings are within the Blackwood River catchment. The Blackwood River was targeted because the south west community are pushing for the river's rehabilitation.

The final planting is within the Wellington catchment on the Collie River. This river is an important domestic and irrigation water source for the Great Southern.



Farmer's field day discussing tree crop establishment techniques.

River Red Gum

(*E. camaldulensis* project)

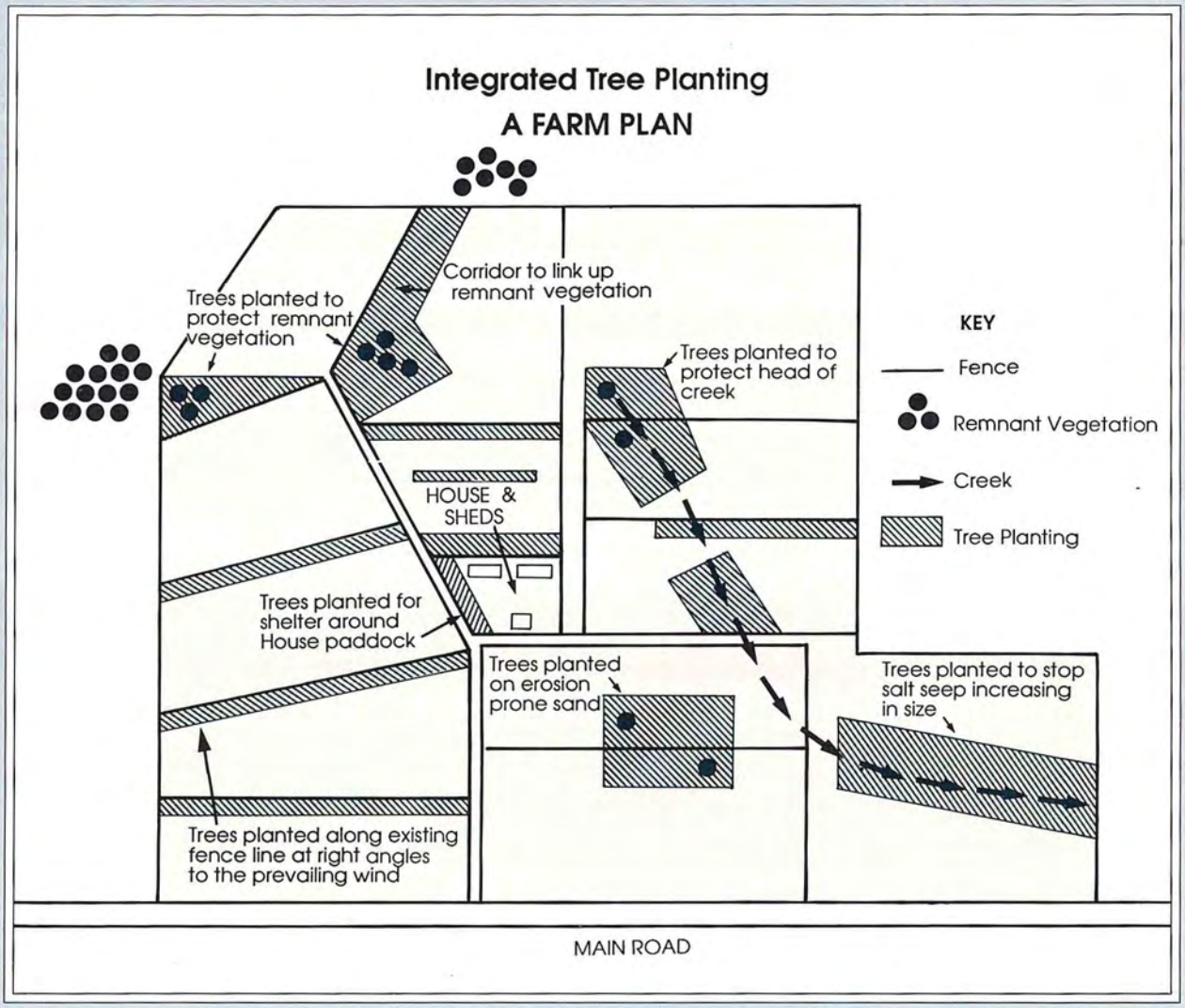
A productive salt-tolerant tree species would be valuable for valley bottom planting for long-term salinity control in farmland. During winter 1990, the National Afforestation Program funded a small separate investigation and demonstration of the potential for *E. camaldulensis* to be this salt-tolerant species. The objectives of the project were to gather wood and pulp production data, and to demonstrate complementary planting with upslope timberbelts.

The results of the initial work on wood and pulp yield indicate reasonable promise. Wood yields up to 5 m^3/ha/year over 10-year rotations, and pulp yields of 45 per cent were indicated from existing stands on salt-affected farmland. Field trials to test the yield of selected salt-tolerant clones were established, and 150 ha of plantings were established.

INTEGRATED TREE PLANTING: THE FUTURE

Timberbelt planting of pulpwood eucalypts appears to be economically attractive on its own account, with the potential to provide a range of secondary benefits on the farm, and if extensively adopted, to provide important environmental benefits for the rest of the community. The timberbelt planting concept is flexible enough to have a role as an integral part of any farm.

Carefully designed timberbelt plantings will form an important component of a new generation of agriculture in areas with rainfall greater than 600 mm. Farmers will have control over groundwater systems, land and water degradation will be greatly reduced, and farm productivity will increase. Some 20-30 per cent of farmland will be under tree crops which will support a major pulpwood industry.



Produced by the Department of Conservation and Land Management
50 Hayman Road, Como, WA 6152
Telephone John Bartle (09) 367 0333

0824 0890 5M