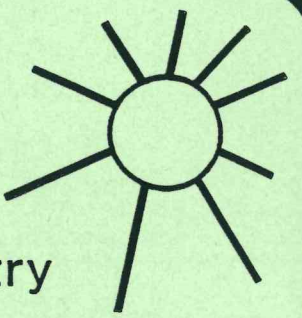
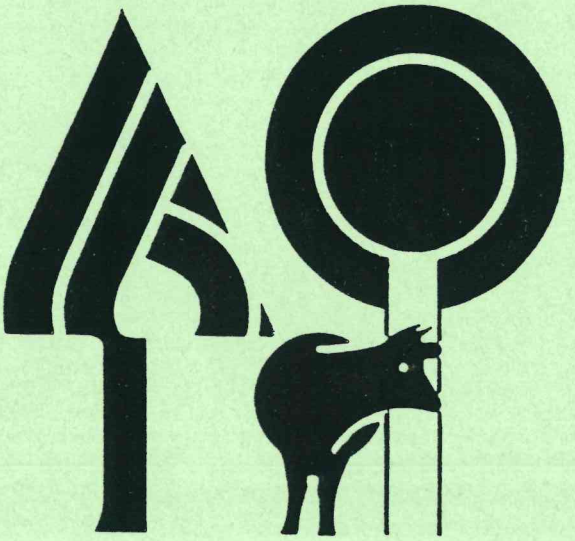
Agroforestry Update



Newsletter for Agroforestry

Researchers and Practitioners



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NATIONAL SOIL CONSERVATION PROGRAM - TREES IN ESPERANCE, WESTERN AUSTRALIA

by David Bicknell,
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Esperance

Managing trees for land degradation control and a possible commercial product has been investigated several times on the Esperance sandplain.

Esperance is about 600 km ESE of Perth and on the coast. The sandplain is a strip along the coast, with some interruptions, that extends from Albany to East of Esperance; a distance of about 600 kms. It stretches inland between 35 km and 80 km, and is bounded by mallee country to the North and the Southern Ocean on the South.

The region is well known for its fine sand soils, and highly erosive wind. Two thirds of the 400 to 600 mm rainfall falls in the autumn to spring period; one third falls over summer. The Esperance region sandplain covers about 1.1 million hectares.

Tree History

The style of clearing used in the main period of development (1950s) meant that large tracts of land were exposed to wind erosion following cropping and clover harvesting. Pinus pinaster (Maritime Pine) and Eucalyptus gomphocephala (Tuart) were planted in single and double row windbreaks along many road verges to help prevent sand drift from farms.

Observations by farmers of the soil erosion control and increases in agricultural productivity behind the windbreaks has led to more tree planting, especially since the early 1980s. Richard Moore, of CALM Busselton, Western Australia, surveyed pine timber potential in the Esperance region in 1986 in the light of new management techniques for pine shelterbelts. The outcome was promising, and Richard applied for National Soil Conservation Program (NSCP) funding to investigate and encourage the use of managed shelterbelts to reduce land degradation and increase agricultural productivity. Timber products were seen as a possibility with pines on suitable soils.

NSCP Landcare Project Objectives

1. Plan and encourage establishment of tree planting with a relevant management package to treat or prevent land degradation.

2. Document and demonstrate a management package using trees on farms that will provide landscape stability. That is, control wind erosion and reduce salinity.

3. Measure the effects of shelterbelts on agricultural production.

4. Extend the tree landcare package to farmers and the Esperance District Land Conservation Committee.

Progress and Directions to June 1989

The project started in March 1988.

Farm planning was seen as a requirement for sensible tree planting on most sites. In co-operation with two other NSCP projects in Esperance (Department of Agriculture), joint project sites have been established on private farms for future demonstration. Measurements of pine growth rates, watertable under windbreaks, eucalypt coppice growth, and crop production in relation to windbreaks are all being done.

The easiest to measure and most gratifying data has come from lupin and oat yields between young pine windbreaks. Parallel, five year old windbreaks are about 200 m apart. The yields between showed a small area of competition and a large area of yield gain. More crop areas will be measured in 1989/90.

Pasture measurements in the lee of mature tree windbreaks have been more complicated to interpret. The presence of a windbreak changes pasture growth directly (by shelter effects) and indirectly (by influencing grazing behaviour and the farmer's fertilizing practise). On the sandplain, this can lead to the development of non-wetting sands and large grazing pressure gradients behind the windbreak.

Extension

Trees, and their role in treatment and prevention of land degradation, have become a national issue over the last five years. This, combined with a few years of good seasons, higher wool prices, and the spectre of rising saline watertables in the region, have made many farmers very keen to learn about tree planting.

At a recent tree planting machinery field day, more than 120 people stood in a continuous downpour to view machinery from four companies.

Farm planning workshops with vegetation planning are being requested by local catchment groups.

Newspapers and radio stations are accepting nearly all news items concerned with trees.

As an indication of the interest, about 350,000 seedlings were planted in the Esperance region this year. 'Home grown' plants, direct seeding, and areas of natural regeneration are extra to this figure.

Direction

The last serious regional wind erosion was in 1981. Waterlogging and salinity have been of increasing concern over the last few years. Watertable monitoring has shown some areas with 30 to 60 cm rises per year.

Winter waterlogging and summer recharge is leading to interest in perennial pastures, drainage and trees. Although technically little understood, trees for drying salt areas are being tried on many sites. Bore holes for monitoring the watertable have been put in by the Department of Agriculture.

In summary, the concerns of Esperance farmers centre on land degradation from rising salt/watertables, wind erosion/exposure, and non wetting sands.

Trees are a useful tool in treating the first two problems.

This NSCP project is well on the way to demonstrating some quantitative gains from managed tree belts, and encouraging the planned use of vegetation on farms.

SUMMARY OF STAG

by David Cameron

Project STAG was commenced in 1983 to examine the competition between a tree (Eucalyptus grandis) and a pasture (dominated by Setaria sphacelata) for water, nutrients and light. A competition ring design was used which provided a range of tree densities from 22 to 3,580 stems ha^{-1}. The experiment is located at Samford (23 km west-north-west of Brisbane) and researchers from four CSIRO Divisions, both Brisbane Universities and the Queensland Institute of Technology were involved in various aspects of its installation and monitoring.

The major findings after three years of intensive measurements of pasture and tree production and soil water content are as follows:

1. Pasture production was not lowered by the presence of trees up to a stand density of about 300 stems ha^{-1}. The trees were then about 9 m in height.

2. Pasture nitrogen and potassium contents were higher under shade than in the open.

3. Individual tree biomass production was highest at about 300 stems ha^{-1} and decreased to both higher and lower densities.

4. At high stand densities (2,150 stems ha^{-1}), trees exploited soil water very effectively, removing it to wilting point to a depth of about 1.5 m after 1 year, 4 m after 2 years and to deeper than 5.6 m after 3 years.

5. Trees seemed to benefit from a "mutual protection effect" at all stand densities. This was of most benefit to the trees at the highest stand density in the first year. As the trees grew and competition affected growth, the optimum stand density became progressively lower to 1,000 stems ha^{-1} at age 2 and 300 stems ha^{-1} at age 3.