REPORT ON SANDALWOOD TRIALS
NANGA 16-20 OCTOBER 1989

The site of the CALM Trial was inspected, monitored and mapped for future operations. A number of sites that were cut and marked by Mr Pinnegar in 1987 were checked. Curtin University Trials were also inspected.

CALM TRIAL

The trial design includes 4 techniques of plant/regeneration protection. Each plot has 25 trees and the site treatments are:

1. no treatment to site after tree removal.

2. brambles (tops of the removed tree) to be put back over the site to protect any regeneration.

3. site to be fenced with ringlock (protection from sheep and goats.)

4. site to be fenced with rabbit netting (protection from rabbits, sheep and goats.)

There is a replicate of the above but the contractor to apply seed to the site to ensure viable seed is at each site. This replication has not been completed due to the poor seed set in 1988. The seed set was presumed destroyed by Cyclone Herbie in late May 1988 which hit at flowering time and no flowers were set, therefore no seed. It is anticipated that there will be a reasonable seed set in 1989 and seed will be applied to sites in 1990.

OPERATORS CURRENT TECHNIQUE

Due to the soil type, vegetation and depth of sandalwood taproot, it is extremely difficult for the operator to remove all the stump and roots without causing extreme environmental damage. It therefore seems more practical for the operator to remove as much as possible of the basal section using a chainsaw and shovel. But in most cases there is sufficient material left within the site that given the right conditions the stump and or roots will coppice. The operator has also randomly cut some trees at ground level without any further treatment. This will give the opportunity of comparisons with previous cuttings and Curtin trials.

It is felt that the current method of extraction will be close to the final recommendation in the management plan for a substan~~tial~~able sandalwood operation on Nanga.

DISCUSSION

As the trial is still being put into place e.g. seed enrichment will not occur until 1990, we can only make some observations at this stage.

A summary of all sites is attached and from that summary the following observations are made.

1. Effect of Shade.

Shade in the field does not appear to play a part in coppice re-growth or in seed germination. Virtually all tree sites are exposed to the sun for the greater part of the day. Already 60 sites out of 200 (30%) are showing active coppice growth. In those sites that have seedlings emerging, shade does not appear to influence emergence. Most seedlings tend to be in the open usually in that area where soil has been shovelled out from the butt and has buried the seed.

Shade may have a role in the survival of seedlings over summer, especially in the first year.

2. Coppice.

Coppice has appeared in 30% of the sites. This is usually on butts that have been cut at or just below ground level and there is a distinctive ring of coppice signifying the butt shape. In some sites it is presumed that the coppice is from roots. The operator has also suggested that some sites looked as if it was old coppice as he found several stems emerging from the one site and growing into each other at the base. This would be quite possible as previous cutters would have had the same problems as todays operators - the stump can't be pulled out and would have been cut out.

Most coppice is multistemmed with the more advanced material having in excess of 50 small stems emerging from the butt. In a couple of cases, a few of the stems were quite yellow, almost as if the chlorophyll system was not working. These stems were the same height and looked healthy otherwise.

When we look at the cutting done in 1987, from 34 sites checked 25 or 74% have coppice as at 20 October 1989. Most of that coppice has appeared in 1989 although some which is over 1m high is much older.

Curtin University plots, put into place in May 1988, show a 60% coppice rate in the time of cutting trial and 28% coppice rate in the height of cutting. Virtually all this coppice has appeared since August 1st 1989 when these sites were last checked with Dr Diana Barrett.

It therefore seems as if the winter rains or the winter temperatures promote the coppice and the winter of 88 was not wet or cold enough to initiate early coppice.

There has been no apparent grazing of coppice in any of the areas even though one site is beside a well used sheep track. Again this raises the issue of whether the Nanga sandalwood is more bitter in its leaf and therefore stock do not worry it at all.

3. Seedlings.

Many of these sites have seedlings although there is no pattern emerging. Obviously many sites did not have viable seed in the latter half of 1988 when these trees were cut. In other cases there are many seedlings and most just have a few or one.

The only observation made was that in the sites where there are many seedlings, germination has been enhanced by the seed being covered during operations. A few sites have seedlings emerging from the old mulch layer and from under brambles but the general feeling is that the cover has not influenced germination as much as the fact of seed being buried. Several seedlings were observed well away (±10m) from the site in open conditions.

Some seedlings are wilting with a few even already dead. This is probably an indication of another low rainfall year.

FUTURE PROGRAM

1. There are still some sites that need fencing in the seed enrichment area. This will be completed this year.

2. Sites 101-200 will be seed enriched in 1990 by placing 6 seeds in a defined area at each site.

3. Regular monitoring will be made mainly autumn to identify summer effects and spring to identify winter effects.

PROPOSED INTERIM MANAGEMENT PLAN FOR CONTRACTORS

On the basis of observations made up until now, I suggest that any sandalwood cutting operation has the following guidelines.

1. Trees to be cut just below ground level to encourage coppicing.

The presumption here is that coppicing is a viable alternative in the Nanga area as is indicated by observation at this point in time. After cutting below ground level, loose sand can be spread over the stump to stop the stump drying out too prematurely (there is no evidence that the stumps dry out too quickly except where there is already a pipe in the stump. This has been observed).

2. Trees selected for cutting should have fresh seed (12 months old) on the ground.

There is signs of good seedling emergence in some sites which I believe would relate to a good seed crop in the previous year or two. I don't think it would be a big problem to bypass a tree without seed this year and cut it the following year.

This seed should be buried 2.5 - 5cm deep around the mulch layer.

(Alternative) Fresh seed should be buried in the mulch layer at a depth of 2.5 - 5cm at each site.

C.A.L.M

SUMMARY OF TRIAL

All plots

Code 1. Number of trees marked as being coppiced: 166

2. Number of trees showing new coppice: 61 = 37% of (1)
30% of all plots

3. Number of sites with seedlings: 88

4. Number of sites with seedlings and coppice: 23

5. Number of sites with seedlings and no coppice: 65

6. Number of sites with no response: 73
(either seedlings or coppice)

7. Number of sites with old stems remaining with 5 metres: 53

8. Number of old stems within 5 metres: 95
(excluding undersize stems in general trial area)

Plot Comparisons - Selected codes including all plots.

Code	Control	Brambles	Ringlock	Rabbit net
2	15 out of 50	11 out of 50	14 out of 50	21 out of 50
3	18 out of 50	23 out of 50	22 out of 50	25 out of 50
6	24 out of 50	19 out of 50	18 out of 50	12 out of 50

Notes:

Coppiced a.g. means the tree was cut above ground level usually within 25mm of ground level.

Coppiced b.g. means it was cut below ground level.

insig. means that shade was an insignificant factor for that site.

(Ringlock) in brackets means that fence is not in place yet.

Summary of some commercial cutting
Cut between 28 Nov & 12 Dec 1987.

Total number of trees checked: 34

Number of trees shown as Coppiced 1987: 13

Number of trees showing new coppice: 25

Number of sites with no response: 6

Number of sites with seedlings: 11

Number of sites with seedlings only (no coppice): 3

Remaining undersize trees within vicinity of sites when originally cut: 26

Number of sites with either coppice or seedlings 28 = 82%

Comments

1. There is a discrepancy between number of sites shown as being coppiced and number of sites that has new coppice growth. This is because either

   i) Some tap roots were left although cut at depth and not considered as being coppiced. This may explain why some sites have taken a long time to show coppice.

or ii) root coppice is prominent. This can only be checked by excavation.

2. Seedling germination better in 1989 than 1988 probably due to lower rainfall in 1988. Seed appears to stay viable for several years if buried.