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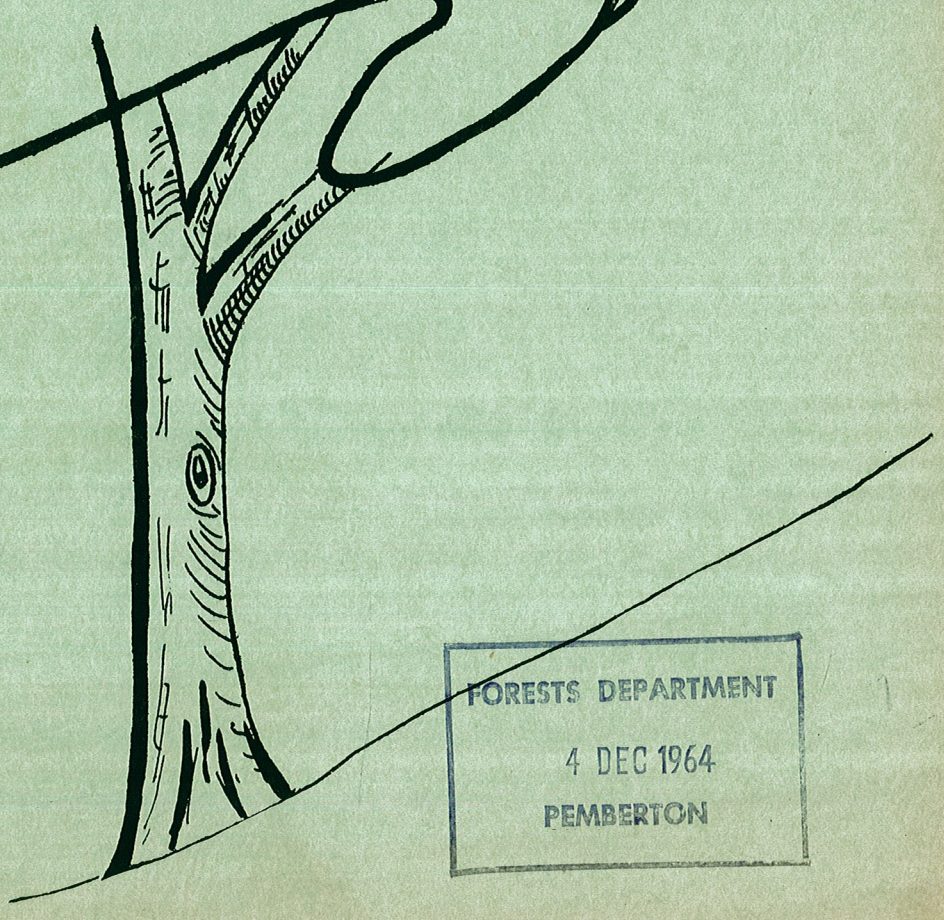
FOREST NOTES



FORESTS DEPARTMENT
PERTH
WESTERN AUSTRALIA

VOLUME 2 NUMBER 4

CONTENTS

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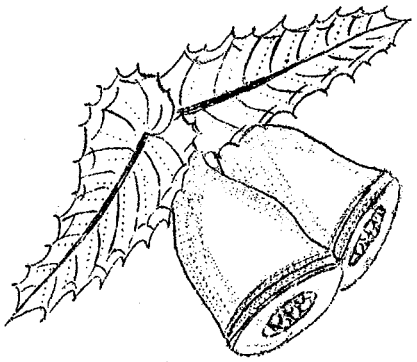


SEASON'S GREETINGS to you all
From us of "Forest Notes",
Success we've had, its surely due
To readers and their quotes.

And next year may we better do,
With manuscripts and papers
From you, and You, and You and You,
Of trees and timber capers.

- - - -

Note: For the botanists: The leaves are of Hakea amplexicaulis and the bells are fruits of Eucalyptus priessiana.

Editors

RAISING EUCALYPTS

By O. W. Loneragan.

The two nurseries at Hamel and Dryandra have been developed primarily to meet a demand by the public for Eucalypts and other trees for planting in country areas. It is essential that a tree be sturdy and healthy. The public generally prefer large trees; to be satisfactory, a large tree needs a large container. However, factors such as packing, handling and rail freight have had to be taken into account and the container size used represents a compromise between what is desired by the buyer and what can be supplied to him at a reasonable price.

Although developed independently, the pots now in use at our nurseries and which have internal dimensions of $3\frac{1}{4}$" top diameter and depth of 4" contain a bulk of soil approximating to that considered by F A.O. authorities to be the minimum desirable for Eucalypt seedlings, viz. 300 cubic centimetres (see A. Metro, F.A.O. Eucalypts for Planting 1955).

Under natural conditions in south Western Australia, Eucalypts germinate in autumn and early winter and thus have cool conditions in which to establish. Plants raised artifically when seed is sown in autumn must either be planted out in the first winter at an early stage in their development or held over for more than 12 months in the nursery before planting out during the second winter.

These older plants become unduly large and develop severe root coiling particularly if grown in pots having only a small opening in the bottom. Coiled roots after planting strangle the main root development and the trees are subject to windthrow. This condition may be to some extent, relieved by cutting through the root coil before planting.

Sowing in spring under artificial conditions and planting out 8 months later in winter saves half the nursery establishment and space compared with raising plants by sowing in autumn. The spring sown seedlings are tender and need more protection and shade during the summer.

Containers of many types are used for raising trees. These may be broadly grouped into non-expendable and expendable. The more durable (non-expendable) containers which generally are recovered are the metal tubes, cement and earthen flower pots. The most favoured expendable tubes in Australia have been softwood veneer, but polythene plastic tubes and also pots of compressed peat have now been introduced into some nurseries. The surface area of tubes of the size normally used (about $1\frac{1}{2}$" diameter) is,

however, regarded by some authorities as inadequate for the development of sturdy plants. The bottomless earthenware pots now in use by the Forests Department constitute a compromise between tubes and pots. Being $3\frac{3}{4}$" in outside diameter the surface area is adequate for healthy shoot shape and development.

Another method of raising eucalypts is in flat trays which are transferred directly into the field for planting. A network of roots during growth extends over the bottom of the tray. Control of this network and restriction of root development to the individual soil ball by slicing crosswise frequently to separate each plant in the tray in practice is difficult and may need more thorough testing. In practice so far when transplanting from the trays into the field, the biggest plants receive the greatest root damage. This technique, therefore, is not favoured.

Trials comparing open-rooted plants with those raised with undisturbed roots in peat jiffy pots in a shorter interval has been tested by Australian Paper Manufacturers Co. Ltd. (Victoria). The compressed peat pot permits penetration by the root tips and desirable root shape and development without root coiling is encouraged. Establishment of open rooted plants in the field is uncertain and mortalities increase with adverse conditions. Re-filling 12 months later to replace mortalities is unsatisfactory. A higher take with the jiffy peat pots, however, is possible under adverse conditions in the field.

When the question of raising Eucalypts for establishment in the lower South West arose, cheaper and smaller plants were necessary. The cheaper plant in small containers such as the small jiffy pots could be raised in greater numbers of smaller size in a shorter period. This new technique was tested at Manjimup in 1963. A review of results reported in the same year by A. J. Hart follows -

1. Methods of raising Eucalyptus seedlings in jiffy pots at a field station with limited nursery facilities are described.

2. Potting soil of black organic sand and brown sandy loam was mixed with 3% and 6% Nitrophoska (red) by volume and sterilised with methyl bromide. Subsequently small additions of blood and bone to the 3% mixture gave results equal to the 6% mixture.

3. The rate of filling $2\frac{1}{4}$ inch pots was 100 per man-hour. 5,300 pots required 18 c. ft. of soil mixture. This represents 5 oz per pot as compared with 16 ozs. for the earth ball in the standard earthenware pot. This saving provided 3 times as many plants for the same weight of mixture - an important factor where trees need to be transported by hand over rough terrain.

4. The rate of direct seeding was 600 pots per man-hour. The use of a pepper shaker - shaking up and turning upside down - kept seed and chaff mixed, resulting in uniform seed distribution in pots.

5. Sowings were made at fortnightly intervals from January into March. Height attained at planting time ranged from 3 ins. to 15 ins. The larger plants were top heavy and difficult to handle for distribution in the field.

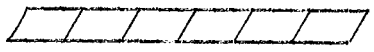
6 Karri plants of the most suitable size (about 8 ins.) at planting time were obtained from sowings made in mid-February.

7. In view of the very small size of the containers, frequent watering was necessary. The outer rows of pots dried more rapidly and watering intensity had to be regulated to provide for this.

8. The seedlings, 14 days after germination under 90% shade, were moved out under high bush shade (60%) for one month and then placed under 50% plastic weave (Sarlon cloth) over frames for one to two months before hardening off in May. Spraying once weekly with Zebtox at recommended concentrations using 3 gals. overall, prevented "damping off".

9. The calculated cost to produce seedlings in pots by direct seeding was £11. per thousand (including £4.3 for pots). To produce transplanted seedlings in trays cost the same. (These costs are nett and do not include overheads or administration charges.)

10. In other trials with open rooted Karri seedlings, wrapping in plastic sheeting was highly successful for preventing damage through desiccation during distribution.



From Hutchins (para. 22) on -

Watch-Towers and the Hill Top Forester

"With forest fires, like other fires, the most important point is to be able to pounce on the fire and extinguish it before it becomes serious. And this is so easily done when the Forester sees it from his house, summons his men, and runs down hill on to it."

* * * * *

"THE DUTIES OF THE WORKING PLANS OFFICE."

by

A.J. Williamson.

The popular conception of the work done by the Working Plans Offices may be summaried by the words :-

Air Photo Interpretation.
Assessment.
Growth Plots.

These three fields are indeed the backbone of much of the work done at the two field centres, Harvey and Manjimup.

To ensure that the State's dedicated forest areas are harvested on a sustained yield basis, it is necessary to know the volume of trees present and their growth rate. The Working Plans section of the Department was established in 1954 to provide accurate statistics of the volume of the forest capital and of its growth rate.

The volume of the forest capital is obtained by assessment based on forest types demarcated from air photos. It is believed that the use of air photos has reduced the amount of assessment needed by about 90% of that needed using "long-line" assessment. Air photos also give a picture of all the forest, whereas the old "long-line assessment" revealed only a narrow strip of it. The early workers for the Department deserve credit for their air photo interpretation which is held in high regard by foresters in the Eastern States. In 1960 the Department produced the Inventory of Forest Resources and Western Australia to make such a detailed statement of the volume of its forest capital.

The growth rate of the forest capital is determined by measuring plots at intervals of several years. About 100 x $\frac{1}{2}$ acre plots have been established throughout State Forests since 1961. More plots are being established each year and it is hoped that there will eventually be 500. These plots are easily recognised in the forest by the white paint band marking the point of measurement on each tree in the plot.

While most of the work carried out by the Working Plans Offices is connected with determining the volume of the forest capital and its growth rate, many other duties are carried out such as the keeping and checking of records (e.g. cutting records) for management purposes, and assisting divisions with their fire control duties. The various duties of the Working Plans Offices

can be grouped under the general headings of "Routine Work" and "Project Work." These are set out in some detail in the following paragraphs :-

ROUTINE WORK:

1. New Information.

   a) Obtaining volume information from A.P.I. assessment.

   b) Interpreting air photos of the entire south west land region.

   c) Establishing increment plots in the hardwood forest.

   d) Producing volume and area data for:

      i) the forest inventory.
      ii) the current general working plan.
      iii) State Forest proposals.

      These voluem statements are presented on Form F.D. 420.

   e) Pine Site Quality mapping of all plantations. Harvey W.P.O. handles all this work.

   f) Mapping marginal forest areas. Head Office maps the prime forest areas and where the topography is too difficult for a multiscope or sketchmaster to handle.

2. Maintaining Records for Management Purposes.

   a) Checking pine and hardwood progress plans for all Divisions and transferring the information to Head Office copies. A copy of hardwood cutting records for each region is kept at the Working Plans Office concerned.

   b) Plans showing cutting by decades in all areas are maintained at the Working Plans Offices.

   c) Maintaining summaries of monthly mill returns (FD390B) and the DFO's quarterly summary of assessment of cut over bush (FD423) for each sawmill permit.

   d) Noting changes in land tenure on our tenure plans.

3. Assistance to Divisions.

   a) Renewing tower and co-ordination plans.

   b) Manning the check point at a large fire.

   c) Distributing air photos required by the Divisions for track selection and other projects.

d) Final preparation of some plans for the soil surveyor.

e) Supplying volume data for areas on request.

PROJECT WORK.

This is carried on in conjunction with the routine work and currently consists of research into assessment techniques at Manjimup W.P.O., and research into grouping of A.P.I. types at Harvey W.P.O.

In the past the following projects have been completed:

a) The Dombakup Working Plan study.

b) The Karnet Working Plan study.

c) State Forest proposals for vacant Crown Land areas.

d) Timber on the Murray River Dam area.

e) Wandoo distribution and volume in the Northern region - with the help of the divisions concerned.

f) Interpretation of the air photos of the Dwellingup fire area.

g) Sleeper milling resources in the Southern Region.

h) The firewood potential for the Augusta region.

i) P.P.T.R. resources in the Southern region.

j) Karri regrowth interpretation and pulpwood resources in the Southern region.

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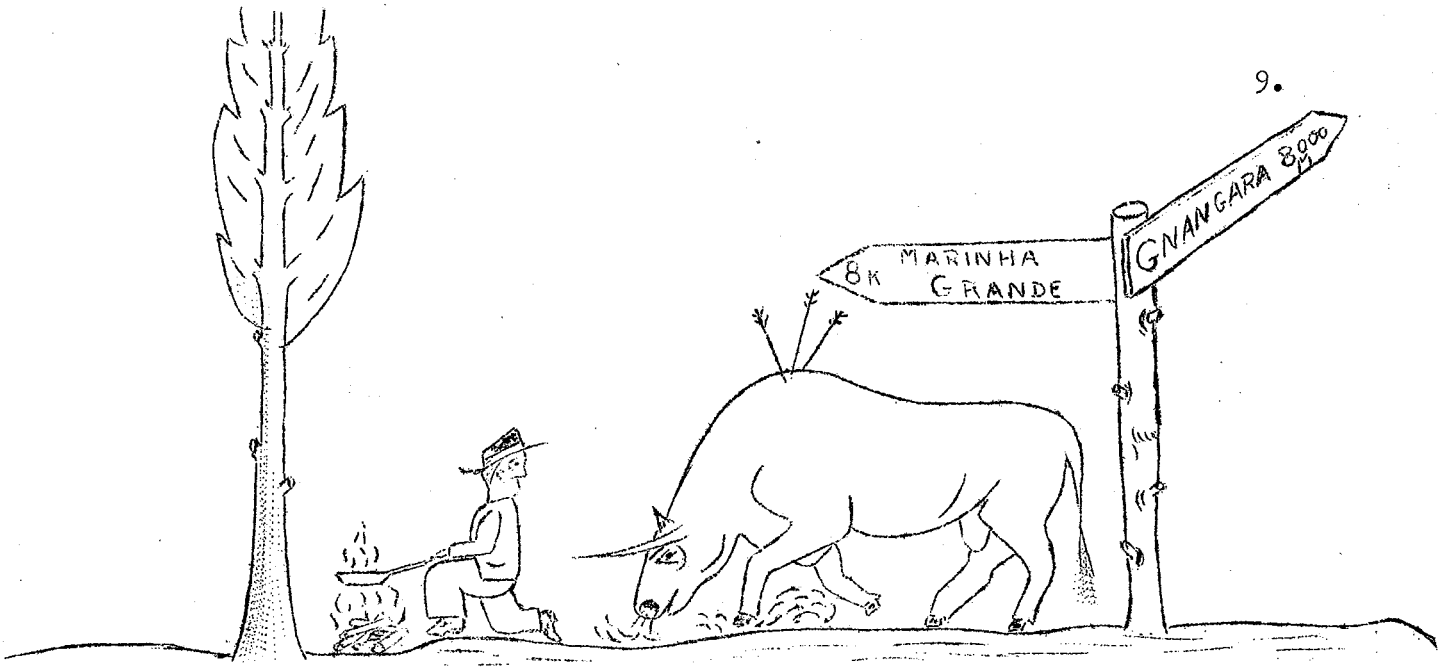

PERRY IN PORTUGAL

It is a year this month since I left Western Australia and I expect most of the chaps on the staff who know me, are beginning to realise that they have not seen me about recently, and are beginning to wonder what has happened to me. I can report that I am still very much in the land of the living, and up to my ears in Pinus pinaster, and so, as happy as it is possible for me to be outside Western Australia.

Any Australian and particularly a Forester, would love this country and feel completely at home. The climate is very similar to that experienced in the South West part of our State, the people are kind and friendly, the March flies are numerous and vicious and have a very silent approach, the sand flies are most affectionate, and the ticks numerous and aggressive. I have lost about half a stone since coming here, a result I guess of the miles I have walked searching for the elusive plus phenotype. However, I am as fit as the proverbial fiddle and am now probably better acquainted with the pine forest of Leiria than most of the local Foresters and Guards.

The Pinhal de Leiria, or Pine Forest of Leiria, is actually some eight or ten miles from Leiria, but was so named when it was established by Royal decree some six hundred years ago, because Leiria was the nearest town. Later on the town of Marinha Grande grew up on the edge of the forest and the forest headquarters and administrative centre is now established there. A considerable area of the forest facing the Atlantic ocean is purely protective, established and maintained to stabilise the dunes along the coast. It is an interesting sight to see trees a hundred years old and more

contorted and prone, but healthy and vigorous. Pinus pinaster will stand considerable exposure to the salt laden winds from the ocean, if it can get its roots into something with a little nourishment in it. These sands are more fertile and contain a negligible amount of calcium when compared with the coastal sands comprising the "Quindalup" association north of Perth and along our beaches.

The forest is managed on an eighty year rotation for the production of timber, and if some of our Pinus radiata enthusiasts will excuse me, the older stands of site quality 1 and 2 forest are most impressive. Mean dominant height for site quality 1. is about 106 feet. It is not easy to obtain useful production figures here as branch wood fuel is included and past thinnings are not included. For what the figure is worth site quality 1. yields 190 loads of logs and firewood plus all past thinnings, at age 80 years. To keep things in perspective keep in mind the very poor soils that are producing these yields. The final clear felling produces some magnificent logs with a high percentage of knot free wood.

The peasants clean up all the debris and cart it away for fuel and bedding for their animals, the stumps are all grubbed out and split up for fuel, yielding an average return of three shillings and four pence Australian per stump in royalty. The comparment is then rotary hoed and broadcast sown with about 15 lbs. of seed per acre.

It is interesting to note that although Ips occurs here, it is of little economic importance. Debris is never permitted to accumulate on the forest floor to serve as a breeding ground and this combined with its natural predators apparently keep it under control. Sirex occurs here, but attacks Pinus pinaster extremely rarely.

The first thinnings are carried out at three to four years of age and again at seven years. These tending costs would render any attempt at establishment by broadcasting in Australia uneconomic. Stocking is very dense by our standards in early years, a number of counts in eight and nine year old stands showing an average of 1800 trees per acre. This helps to reduce branch size and improve form, but is achieved at a considerable loss of timber production.

Although the rotation is 80 years for Pinus pinaster in this country, trees up to 170 years are to be seen in the forest. Health and vigour remain good to 130 and 140 years of age and the log as sound as a bell.

The quantities of Pinus pinaster seed collected and sown in this country are fantastic, the Forest Service requirement for this year alone being 500 metric tons. There is no supervision of the collection of cones and they can come from anywhere and from any type of tree. A most favoured collecting spot is the horizontal protection forest along the Atlantic coast.

A quarter of the area of this country is under forest and woodland, the bulk of this being Pinus pinaster, but only 5% of this

area is State Forest.

The search for plus phenotypes which brought me to this country is now more than half completed and the results have been most satisfactory. I have been successful in locating some splendid trees, and scions for grafting from all of these, are now in Australia and New Zealand. When the progeny of these trees are being used for plantation establishment in a few years time we will really be in business.

Some of the older members of the staff may remember Dr. Stoate's efforts to employ women and girls in the field during the last war. He could have learned a thing or two in this connection by visitng Portugal. The Forest Service has some 300 women and girls working in the Pinhal de Leiria alone. They are employed to hoe, rake and sweep the firebreaks, carry out all the early thinnings and scrub cutting, build roads, tend the nurseries, in fact do the bulk of the work not concerned with resin tapping, falling, log hauling etc. They are a gay and happy lot and one hears more singing while you work and sees more smiling faces than is the case at home. Apparently split level homes, linings to the bath room, bridge afternoons, motor cars and a Dior frock are not essential to the making of a happy and light hearted person. Although these people, both men and women, work very hard and own few material things, they are a proud and happy people.

In the Serra Estrela, the highest mountain range in Portugal, the Forest Service is engaged in restoring the forests to this region and the first requisite is access roads. Some of these roads are really frightening in the way they cling to the mountain sides. Many of them are only jeep trails and as one rounds the spurs in a hairpin turn all that can be seen is sky. A swerve of a couple of feet and one would be on the way straight down as there are no guard rails. Each peak seems to be a challenge to these Portuguese Foresters to put a road to the top. They zigzag upwards for a start and when sufficiently high they take the track round and round in a spiralling climb. Going up is frightening and coming back down is terrifying, or perhaps it is I am getting old. We spent a couple of hours with one gang of men who were building a road the hard way, using picks, crowbars, shovels, etc., and moving the earth and rocks in wheelbarrows. They work 10 hours a day for six days a week, and receive 30 escudos (10/- Australian) per day. They walk anything from two to seven miles to work and climb from 1,000 to 5,000 feet in the process, walking the same distance home after work, both ways in their own time. These chaps really know how to work and are as tough as nails, but the thing which impressed me was that they still had enough wind to spare to sing, rib one another and laugh frequently. One gained the impression they not only liked what they were doing, but they were taking a very real pride in doing it.

Appreciating that all our staff are not necessarily interested in Pinus pinaster, working girls and road building, they may be interested to hear a brief account of a Portuguese bull fight. I have only had an opportunity to attend one of these functions so far, but to my surprise I find I have the makings of an ardent fan.

I think if I could get the Conservator, Fred Gorringe, Ernie Budd and a few more of our football enthusiasts to see a bull fight, they would reckon Australian Rules footy is strictly for cissies, and devote their energies to establishing Portuguese rules bull fighting in W. A. I should state at this stage that although I am an enthusiast for this sport, so far as I am concerned this enthusiasm is confined to the spectator's angle. I have no desire to become a participant. The men who engage in this pastime are either very foolish, very brave or a mixture of both. I had no trouble in deciding I was a coward after taking one look at an angry bull.

The ring in which the performances are held is about 100' to 120' in diameter, and is surrounded by tiers of concrete seats. Everything is set in concrete and either bolted or welded in place. This is necessary as the volatile and excitable spectators are liable to hurl everything movable into the ring, if a bull or a fighter displeases them.

Each performance consists of eight fights with eight separate bulls. In Portugal where the people are more civilised and humane than in Spain, the bull is never killed, and apart from having five small barbed darts stuck into his hide on top of his shoulders, is not harmed in any way. Any danger is to the men who participate and they are only a hairs breadth from tragedy all the time. However they are there from choice and not like the bull, from compulsion.

There are two types of performance, one in which the bull is irritated by a man on horseback, who places five darts in the bulls hump, the animal then being tackled by eight men on foot who catch him and hold him still for a short period before releasing him. In the second type of performance, the bull is fought by a man on foot, who first irritates the bull by placing five darts in his hump and then tackles him with a cape and an aluminium sword, this latter only being used to manipulate the cape.

Associated with bull fighting is a lot of colourful pageantry, beautiful uniforms, trumpets and fanfare. In the first mentioned type of bull fight, the horseman enters the ring and takes up his position opposite the point where the bull will be released. He comes bellowing and raging in and charges everything that catches his eye and as soon as the man and horse move, they become the preferred target. The bulls horns are sheathed in big leather pads so that the horses will not be harmed if touched, but the latter are so clever the bull only rarely grazes them. The horse and rider are superb and act as a single unit, wheeling, turning, stopping and leaping away as if their minds as well as their bodies were one, I have never seen such beautiful horsemanship. Both the horse and rider look as if they loved the fun and allow the bull to chase them around the ring, at the same time carrying out all sorts of skilful manoeuvres. When the bull realises he is not getting anywhere much, he stops and the rider then faces him across the width of the ring. Both the bull and often the horse too, paw the ground before charging one another, the horse and rider at what seems to be the last moment, turning aside and causing the bull

to swing in the pass just under the horses tail. As he does so the rider leans over and jabs the dart into the bull's tough hump. This really irritates him and by the time the rider has done this five time the bull is fighting mad. The rider then leaves the ring and is replaced by eight very foolish and brave young men on foot whose task it is to capture the bull bare handed and hold him quite still for a given time. They line up in singple file across the ring from the bull, their captain in front, and march towards the bull hurling abuse at him. The bull, already very mad, is not standing for this nonsense, and lowering his head charges flat out. The captain or leader who is out in front, tries to take the bull's head in his stomach, passing in between the horns. If he is successful he wraps his arms around the bull's neck and his legs around his head to avoid being tossed, while the other chaps pile in and grab handfuls of bull, one man grabbing the tail. They then exert all their strength to try and stop the bull before they all pile into the safety fence or wall. If the manoeuvre is successful, which it generally was not and took two or three tries while the men were being tossed around like rag dolls, the next step is to release the bull without getting hurt before vaulting over the safety wall. The key man in this act is the man on the tail, who is the last to let go, and cannot do this until his mates are clear. He tries to get the bull near to the wall before letting go, but does not always succeed.

Herb Elliott simply has nothing on this chap. He would fly if he had a few feathers and generally just cleared the wall with the bull's hot breath fanning the seat of his pants as he strove to help him up and over. These young men are all volunteers out to prove their valour and are sons of the old aristocracy and people of importance in the country. It is considered a great honour to be selected. This ends the fight and some belled steers are then released into the ring and the bull driven out with them, still looking mighty full of fight.

In the second type of performance the bull is released into the ring minus the leather sheaths on his horns. He is fought by a single man on foot who first of all places the traditional five darts in the bull's hump, a mighty dangerous pastime as the bull gets madder as each one pricks his hide. Having done this the fighter arms himself with the aluminium sword and cape and proceeds to wear the bull out and get him under some sort of control for the final act of symbolically killing him. The man keeps still and moves the cape which the bull always charges, and this he does again and again, gradually working the bull closer and closer to him, so that he misses him by a hairs-breadth. He then passes the bull alternately in front and behind him until the animal gradually slows down, not so much from tiredness as from the frustration of continuously charging something which flutters away. In this type of fight in Spain the bull is killed with the sword as the final act, and he is then submitted to the indignity of having his ears cut off, an unfitting end to a brave animal, who has done his best in the only way he knows how. In Portugal the bull is manoeuvred into the position

for killing and the fighter then places a dart in his hide at the point the sword would enter if he was using one. Actually this is more dangerous than killing the bull as the fighter has to stand right in front of the animal and close up, and the small dart galvanises the bull into action and the man has to be might quick to step aside and avoid the passing horns. This completes this type of performance and the bull is removed from the ring with the help of some friendly steers.

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BROWN WOOD.

O.W. Loneragan.

Brown discolouration of the sapwood of pole Jarrah has been recorded in stem anatomy studies in 1952 at Dwellingup as an effect of fire 1950 (Plavins, Compartment 1). The suggestion has been made that this is possibly due to solution in the heated sap of sugars and tannins being deposited in the sapwood on cooling after the fire.

In Karri at Pemberton brown discolouration of the sapwood has been recorded in samples taken in 1955 as an effect of fire 1953 (Big Brook, Compartment 40). Brown discolouration of the heartwood of pole Karri also has been recorded in 1958 in Compartment (8) completely protected from fire. This brown wood was widest at the branch stubs and in the stump; the width varied, rapidly decreasing above the branch stubs but only gradually below them. This occurrence was assumed to indicate incipient decay associated with fungus. Brown wood in Karri therefore may be due to fire or fungus.

The question of what causes the smell associated with the brown wood of Karri has not been confirmed. It is suggested that the sourish smell may be associated with formation of pyroligneous acid (vinegar and alcohol) by fire; or fermentation of starches and sugars in the wood by fungi: for instance, in the main wood solutions, the weak acetic acid (vinegar) on reduction of oxygen is converted to the stronger smelling acetaldehyde (of the mouse smell), and starch is also converted by warm dilute acetic acid to sugars; which, through fermentation by bacteria and moulds (fungi) form alcohol (of the familiar smell): these ingredients may be sufficient then to constitute the sourish spirit of the brown wood of Karri.

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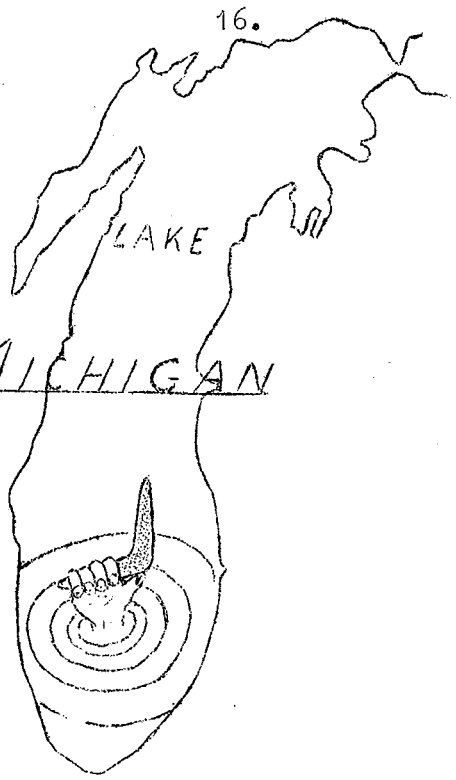

from our MAN IN MICHIGAN

(Jim Williamson, now studying at Ann Arbor, Michigan, reporting)

FOREST NOTES.

Well Managed Forests - All !

All foresters working in the untouched forests to the South should note this heartening news which comes to us direct from an American Forest Management course :-

> "Areas may be productive, well managed, and in a stable forestry minded ownership without there being specific management plans that can be inspected or any definite provision for sustained yield."

Forestry and Politics in America.

As part of their political platform for the November elections, the Democratic Party included the following statement about forestry.

> "(we will) Continue to support balanced land and forest development through intensive forest management on a multiple-use and sustained

yield basis, reforestation of burned lands, providing public access roads, range improvement, concern for small business operations and recreational uses."

A Market for Pine Timber Infected with Blue Stain.

The problem of how to create a demand for pine timber with knots was solved by timber salesmen promoting "Knotty Pine Motels." This was so successful that a demand for knotty pine was created for ordinary buildings to the extent that it is often preferred to clear timber as a lining board.

Following the same type of approach there is a sales programme on the West coast aiming to sell pine infected with blue-stain. Such timber is being marketed under the name "pine-tique", which sounds like antique if say it quickly and you're an American. The small insect holes associated with the blue-stain are a good selling point of timber for dens and other informal areas - an extra nail hole or two will not be noticed besides the insect holes already there.

Paper, Paper Everywhere.

It is difficult to tell which came first in America - the paper industry or the demand for paper. Now they are rolling along pushed by each other's momentum. There is just a fantasic use of paper and paper products in America. Anything sold at any store whether it is a department store, supermarket, drug store or cafe, is always wrapped in a paper bag. Many of the items already have their individual wrappers but these are placed in a bigger bag as you leave the store. Whereas we put our self service purchases in a secondhand cardboard box, Americans have them placed in new, strong brown paper bags (sacks to them). Milk is popular, but I've never seen it sold in bottles. It is always in sealed cardboard cartons, holding up to four pints. Cardboard boxes, as well as large timber pallets, are used for handling fruit on orchards. Every new area I visit seems to reveal another use for paper products.

If W.A. developes along similar lines to America, and Australia as a whole has done so in the past, it seems as if there will be a ready market for the products of any paper industry which may start in Western Australia.

The Slowest Growing Timber in the World.

No, not Jarrah, but bristlecone pine, Pinus aristata, which grows (just) in the High Sierras of California and Nevada.

Recent studies have shown that some specimens of bristlecone pine are over 3,000 years old. Colour photos of these trees show that they are only about 50 feet tall and twelve feet in girth. This is a girth increment of 0.05" a year, or about one tenth as fast as Jarrah.

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"A KARRI SEED PRODUCTION STUDY"

By D. E. Grace

Recently we felled two Karri trees to compare their seeding potential. One was a dominant and the other a subdominant (in virgin forest).

Results as follows -

Tree Descriptions	Tree No. 1	Tree No. 2
Class	Dominant	Subdominant
Height	198'	145'
GBHOB	148"	115"
Age (actual ring count)	150 yrs	120 yrs
(N.B. Growth is about 1" girth/yr)		
Crown dimensions	62' x 66'	70' x 75'
Crown area	3,210 sq. ft.	4,120 sq. ft.

Seed Production Figures - note an endeavour was made to collect all capsules on each tree.

Total weight of green capsules collected	46 lbs	49 lbs
Number of seeds per capsules	2.24	1.15
Viable number of seeds collected	65,000	40,000

There is nothing to conclude about these seed production figures, but they are of interest and further checks will be made.

TRIALS OF SOME EASTERN STATES EUCALYPTS IN THE KARRI FOREST AREA

by

R.J. Underwood

Introduction:

With the aim of studying the growth and development of some Eastern States Eucalypt species in the Karri forest environment, a number of trial plots were established in Nairn Block, Pemberton Division in July last year (Bradshaw, 1963).

These plots were recently inspected and measured and the results are extremely interesting.

The Plots:

Twenty-three plots, 0.1 acres each, were planted as follows :-

E. pilularis (Blackbutt) - 7 plots;
E. gigantea (Alpine ash) - 6 plots;
E. obliqua (Messmate Stringy Bark) - 5 plots;
E. scabra (White Stringy Bark) - 5 plots.

The stock was either tubed, potted or open rooted and the seedlings were planted at 9 x 9 ft. spacing. The plots were established in openings in the forest following logging, either on ash beds or ground disturbed by logging.

The whole area had a Regeneration burn in Autumn, 1963.

Results:

On the first week of October, 1964, all plots were inspected. A survival count was made, and the height of every tree measured. The results are shown summarized in Table 1 below.

TABLE 1

Species	Survival %	Mean of Plot mean heights
E.pilularis	81%	2' 6"
E.gigantea	49%	1' 5"
E.obliqua	79%	2' 1"
E.scabra	85%	1' 0"

Comments:

The overall condition of the Eucalypts was extremely good, with development of seedlings on ashbeds being consistently superior to that on landings and snig tracks. In nearly every plot - except those established on landings - height growth was being inhibited by the presence of fire weeds (Acacia pentadenia and Acacia urophylla), creeper (Kennedya coccinea) and in some cases, dense regeneration of Karri.

Since the survival potential of these species has now been indicated, this scrub will be cleaned out out of the plots, to allow a better study of their later development.

It is pleasing to note that the two best timber species planted (E. pilularis and E. obliqua) showed out to the best advantage. On the best plots, established on deep, well drained ashbeds, the height growth of these species is comparable with that of Karri seedlings on similar sites. For example -

TABLE 2

Species	No. of trees measured.	Mean Ht.	Ht. of tallest tree measured
E.pilularis (Plot 19)	47	4' 0½"	8' 1"
E.obliqua (Plot 13)	40	4' 5"	10' 0"
E.diversicolor (Plot 19)	50	4' 1½"	7' 7"

The Karri seedlings shown above were randomly selected from some 100-odd Karri seedlings which had regenerated naturally within Plot 19 following the 1963 Regeneration Burn.

Reference:

F.J. Bradshaw, Experimental Plot Register, Pemberton.

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AFFORESTATION CONFERENCE : 1964

By D. R. Moore

On the 4th May, 1964, some 23 senior officers of the Forests Department met in the C.S.A. Council Room to confer on matters connected with the establishment, tending, genetics and economics of pine plantations.

Following introductory remarks by the Conservator, Mr. Barrett introduced the subject of "Economics of Pine Pruning". By basing the increased returns for clear knot free pine timber on the relative prices charged for standard and clears in Oregon on the local market, it was possible to demonstrate graphically that there should be a substantial financial gain to be obtained by pruning final crop Pinus radiata trees to a height of 30 ft. Mr. Meachem was then able to show by graphs that even after allowing 5% compound interest throughout the rotation and a recurring maintenance charge of £2. per acre per annum in site quality 3, Pinus radiata a return of nearly £1,500 per acre was possible. The value of logs from final crop trees had to be assumed and was based largely on present day values and did not allow for an inflatory trend.

It is of interest to recall that the plantations now nearing the end of their rotation were in most cases established quite cheaply, in some cases for £5. per acre or even less.

Mr Eastman traced the development of present pruning methods and outlined possible developments mainly in connection with high and extra high pruning. Several suggestions aimed at simplifying and reducing costs of the first pruning operation were advanced and discussed.

A new pattern high pruning saw originating in New Zealand was exhibited. This saw had been tried at Collie and proved more efficient than the standard type, while one produced at Gnangara also proved to be better than the standard type. The tree bicycle had been tried, but it was considered too cumbersome for use in pruning, but no doubt would be useful for research workers who only need to climb an occasional tree. A Morris platform and ladder was on order from New Zealand. The former had arrived and looked quite promising, but its full potential could not be assessed without a ladder.

In conjunction with high pruning, it was pointed out by Mr. Moore that by adjustment of the thinning intensity it should be possible to regulate the height of the lowest point of the green crown to avoid the development of dead limbs and consequently loose knots. The presence of loose knots in timber is regarded as a serious flaw and results in considerable degrade. On the other hand,

tight knots can be accepted in all except the highest grades provided they are not too large.

A graph prepared by New Zealand research workers was exhibited to show the relationship between tree density and the height of the lower edge of the green crown.

Reference was also made to results achieved in South Africa where it had been demonstrated that the rate of growth and, with this, the degree of spirality and fibre length of the timber, was affected by and could be largely controlled by the degree of pruning.

The question of establishment of plantations was introduced by Mr. Eastman who outlined the present accepted methods of clearing, land preparation and establishment with suggestions for possible amendments. These alterations aimed at reducing the overall establishment costs and included such items as windrowing with destruction of scrub and suckers by hormone sprays prior to planting.

Ploughing, although essential in the coastal sand plain areas, was considered to doubtful value in the hills plantations. In fact, in catchments it should be avoided, owing to the possibility of soil erosion and consequent silting of dams.

In regard to spacing, it was pointed out that wide spacing such as 9 x 9 ft., although encouraging early vigorous growth and providing for access, allowed development of large limbs and did not provide an adequate number of good trees for the final group. Any increased costs in planting at closer spacing should be offset by some savings in pruning costs due to the limbs being smaller.

The above proceedings occupied the first day.

On the second day, officers gathered at Wanneroo Headquarters where the methods of grafting in pine were demonstrated by Mr. Hopkins and grafted stock in various stages was examined.

The company then gathered in the laboratory for further group discussion, firstly on scrub control in plantations. A review of past methods and costs was presented by Mr. Moore, it being pointed out that in future the answer could lie in pre-planting elimination by means of hormone sprays. However, where the scrub was well established and competing, the most promising method of control appeared to be by means of the 5' Page Rotary Slasher, while the Holt scrub basher was well worth a trial. Further experiments would also be carried out to check the effect of hormone sprays in established plantations.

The Conservator briefly outlined the work that was being done by Senior Forester Perry, who is spending 12 months or so in Portugal collecting scion material from elite Pinus pinaster trees.

Some of this scion material will be sent to England where it will be grafted onto P. sylvestris stock for later despatch to Australia. Other scion material will be forwarded by air direct to Perth where it will be grafted onto Pinus pinaster stock and held in quarantine in a special glasshouse for the statutory period. It was pointed out that the Commonwealth, South Australia, Victoria and New Zealand were all making contributions towards meeting Forester Perry's expenses.

Mr. Hopkins then outlined the work that had been achieved and proposals for the future in connection with tree breeding. Up to date, most of the work had been concentrated on Pinus pinaster, but work on Pinus radiata had commenced and would be extended. Already a start had been made in the establishment of grafted pinaster stock in a seed orchard on the Yanchep road. A site for the Pinus radiata seed orchard had been selected bordering the Canning Dam.

Mr. Van Noort gave details of a disorder thought to be Diplodia that had attacked the leading shoots of a number of Pinus pinaster trees at Wanneroo, causing various malformations. Examples of the complaint were exhibited. It is particularly distressing in that this complaint seems to attack the vigorously growing trees. Samples have been sent to Kew, England, for identification and latest information is to the effect that it is definitely not Diplodia, but a Basidiomycete (Aurio Basidium pillulans).

The party now moved into the field where they inspected the seed orchard and plantation areas affected with the tip complaint, low pruning operations using a new type light axe, high pruning using the newly developed saw blade, and also the extra long (20 ft.) handle saw. Some officers were persuaded to try their hand with this latter equipment, but found the 20 ft. handle somewhat of a handful.

Officers were so engrossed with the tour that few thought to comment on the lateness of the lunch break. However, it was noted that appetites were good when the lunch site near the old mill was finally reached and sandwiches and billy tea were produced.

During lunch, Mr. Lejeune briefly discussed the question of control burning in pine plantations to reduce the fire hazard. It was generally agreed that there was a need to proceed with caution in this matter and that any burning done should be on a purely experimental basis and fully controlled.

The programme concluded with a brief commentary by the Conservator who said he hoped that officers had benefited from the discussions and emphasised that it must not be assumed that departmental policy had been changed and that officers must await confirmation on the various points that had arisen. Officers were generally agreed that the meeting had been instructive and well worthwhile. It had given them an opportunity for open discussion on many contentious matters and was voted a great success.

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LIGNUM-VITAE - Guaiacum officinale.

There are 4 main species of Guaiacum but G. officinale probably most important.

Common Names: Lignum-vitae.
Guayacan.
Guaiacum-wood.
Holy Wood.
Wood of Life.

Habitat:

Tropical America, Mexico, Honduras, Costa Rica, Venezuela, Jamaica, Guatemala, Nicaragua, Colombia, Cuba, Haiti, Dominican Republic, Puerto Rico - or. briefly:

West Indies and North coast of Venezuela and Colombia.

Wood:

Has been in use since 1508. Very heavy - 881bs/cu.ft; very hard and has a natural resin or oil; heartwood greenish-black darkening on exposure to light and air.

Uses:

1. Bushings for stern tubes of propellor-driven ships. - "owing to the silky nature of the wood and the oil contained in it acting in conjunction with the water, a natural lubricant is formed." Bushings last 3-7 years depending on speed of ship - 3 years in the Mauretania.
2. Sheaves for blocks - have lasted up to 70 years and still O.K.
3. Saw packings.
4. Mallets.
5. Caster wheels.
6. Bowling balls.
7. Masthead trucks.
8. Stencil and chisel blocks.
9. Cable dressers.
10. Turned novelties.

"Steel and tube mills are using Lignum-vitae in increasing amounts to replace brass and babbitt-metal for bearings in roller mills and pumps, as the initial cost is less than metal and

lubrication is unnecessary." (Record & Hess).

Marketing:

The timber enters the market in bolts or logs 2-10 ft. long and 3"-20" in diameter.

References.

Timbers of the New World - Record & Hess, 1943.
A Manual of the Timbers of the World - Howard, 1951.

From Hutchins (para. 52) on -

'The Disuse of Paint on Woodwork'

"Carbolinieum has largely replaced paint in South Africa. It sinks into the wood and, being of an oily, tarry nature, entirely prevents decay. For the ceiling one coat of "carbo" is excellent; it does not show the fly marks. Three coats of "carbo" on the doors give them the dark colour of old oak, which is the best colour for tidiness where children are about."

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Rotational Burning in the Karri Forest - Why Not ?

Mr. Peet (Vol. 2, No. 1) perceived that the initial burn is the key to introduction of cyclic burning in the Karri forest. He recognised that here is a practical problem to be solved in a practical way by applying additional burning teams from the north.

Is the problem really as simple as that? Mr. Peet would agree with those who say not. The initial burning of some 300,000 acres carrying up to 30 tons of fuel per acre can never be simple. Add extreme variation in forest type, height, condition and composition, also limited access and, in many years, a limited burning period and the problem looms larger and calls for the big thinking indicated by Mr. Peet.

Pre-requisite to any effective burning programme in Karri forest are better access and separation of forest types. Type separation is essential in view of the different techniques and weather conditions required for successful burning of Jarrah, Karri and non forest types. Much of the Karri forest roading programme in recent years has been directed at type separation.

On this basis, current policy entails protection of Karri forest, in units of approximately 1,000 acres, by cyclic burning of surrounding and intervening Jarrah and Marri types and of non-timbered flats (i.e. the more readily burnable and controllable types). Limited burning is required in Karri types to ensure continuity of protection strips.

Cyclic burning of the entire forest is an objective to aim at. It will come. Some years ago the writer suggested a different approach to the initial burn.

Approximately one year in five no "severe" or "dangerous" day occurs in the Karri forest. These mild summers cannot be forecast; however, it is possible to recognise an incipient build up to severe conditions.

Already we have 'extensions' to permit regeneration burning until the end of January. It should be possible, subject to adequate safeguards, to burn into the summer by progressive extensions. Safeguards would include -

(a) Restriction of burning to areas bounded by recent protection burns.

(b) Restriction of burning to "Low", "Moderate" and "Average Summer" forecasted fire hazards.

(c) Burning to cease and mop up and patrol to intensify when a falling barometer warns of a hazard build up.

Can the heavy fuel accumulation in the Karri forest be reduced and maintained at a safe level without acceptance of some degree of summer burning?

There are thinking farmers who recognise the problem and would agree with this approach and would be prepared to see the Forests Department burning in the forest for hazard reduction and community protection when all other burning in the district was prohibited.

The key is effective planning and adequate safeguards.

J. C. Meachem

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DAY SAFARI TO COLLIE PLANTATIONS

By P. C. Richmond

On Wednesday, 24th April, Dave Lejeune from Kirup and half a dozen Forest Officers from Grimwade and Nannup visited Collie where Phil Shedley and Stan Casson were our hosts for the day.

We foregathered in the Collie office about 9 a.m., having been on the road for a couple of hours, quite ready for a cup of tea - but no such frills at Collie : straight into the day's work.

First up, plans showing a multiple row seeder were examined. These plans were brought from New Zealand by Don Grace. It was generally accepted by the party that a multiple row seeder was a necessary innovation to our nurseries. The use of this type of seeder would ensure straight parallel rows in the nursery seed beds and thus facilitate post seeding mechanical works such as weed control, application of artificial fertilisers etc. It was also thought the rate of seeding would be much more uniform and, of course, the time taken to sow the seed would be considerably reduced. The great objection to this machine was the cost, being in the region of £600 I would have thought there may be cheaper models on the market, which with possibly slight modifications, would be suitable for our purpose. There is also the point that the cost could be spread over more than one Division and over a number of years.

So into the field and the first stop was Mungalup nursery. Here there was firstly a watering, or more accurately a non-watering experiment - Collie nursery is watered regularly. Here we were shown an area of seedlings which had not been watered since February/March. There was a definite difference in height growth, although it was felt the trial should have been started earlier in the season to give any significant results. Next there was a control of couch grass experiment with the use of "Dowpon" applied at the rate of 2½ lbs./acre. The results we saw appeared to show that complete control had not been achieved and Oscar Pears voiced the opinion that there should have been a heavier application of "Dowpon" followed up by heavy watering of the couch grass. Lastly, after a general look at the nursery, a weeding machine, fabricated at Collie, was examined. This machine, which fitted to a tractor three point linkage, could be drawn straddling a nursery bed. On the machine three men could sit (under cover) and hand pick the weeds. I consider this type of machine would be of more use in a nursery much, much larger than Collie's and that the aim should be to remove weed growth preferably by chemical or mechanical means.

The well trodden path of foresters from a nursery is into the plantations and into the plantations we went: Mungalup Section A - Pinus radiata, planted 1957 - which had been high pruned to 14 ft.

The method used to select the trees for high pruning was the '1 in 8' system, (a modification of the Queensland method) that is selecting from a group of four pairs the best tree, vigour/form (I personally prefer form/vigour). The first selected tree is marked and with this tree at his back the marker selects the best tree from the next group of four pairs. If there are two trees of equal merit the tree nearest the marker is chosen. From this point, in 8' x 8' spacing, approximately a minimum of 100 trees per acre are selected for high pruning. This method is also used satisfactorily at Nannup. A general discussion on high pruning ensued.

Into the cars and to Wellington Section D Plantation of Pinus radiata, planted 1957, to see nettic competition. However, before we could inspect this, Alan Hill's car began to show her age and broke a wishbone pin. Contact was established with Collie workshops and arrangements made for the repair of the car and other transport to continue the safari. (Let us raise a silent prayer to V.H.F.) So to the nettic competition and resultant suppression of the pines. This weed had been slashed twice and bulldozed once and we hope the pines were now well on their way. No plantation can stand the cost of having a bulldozer in to weed too often!

At this point a sandwich lunch was taken. Refreshed, the party moved onto Wellington Section A - Pinus radiata, planted 1960 - where we were shown a trial slashing of Acacia pulchella with a 4 ft. rotary slasher. This model has since been discontinued. Here at Collie it was found to be too light for this scrub. The next item was a management boundary; this is where two age classes of pines had been planted in contiguous rows with the resultant marked difference in height growth. Jock Gilchrist's remark on seeing this was : 'There has been different forms of treatment here!' From the discussion it was finally agreed there should be some form of break between two age groups.

Continuing into Section C for a stop at McCluskey's pines, which were planted when private property, we inspected them. Adjacent we were shown what was listed on the itinerary as a poor spring burn, but those in the party with many years' experience behind them did not agree that it was a poor burn, but was better classed as a good burn.

Thence into the last Section of Wellington Block, Section B, where some rather frightening competition from the Connidia creeper was seen in pines planted in 1962. In an attempt to knock this back and give the pines a chance to get away, a 5 ft. rotary slasher had been hired and we were shown the results. They were good and in a Division like Collie with the amount of weed growth of various species and habits one would imagine a rotary slasher to be an essential item of equipment. In this block the question of road sub-division was given as a topic. General opinion was - the subject should have been 'lack of road sub-division'. The final subject seen and discussed was stag falling in the strip of forest around the periphery of the plantation block to form a green belt,

deemed essential, but must be carried out thoroughly.

Next a scenic drive through Gervasse and Davis Blocks where the question was 'good soil in steep country - should this be planted'? The very broad answer I say is "Yes" when all other more accessible plantable land is under plantations. I did not see any extensive areas too steep for plantations. On to the Wellington Dam and the hydro-electric station. The dam and surrounds are really magnificent and must be a splendid picnic or barbeque spot in the summer (are there any flies?). A few miles further on we stopped for a few minutes at the television relay station being built in the heart of the forest. Not yet erected is the 500 ft. aerial, on which Phil Shedley hopes to have a fire lookout half way up.

Then to our final port of call - Wellington Section T (Tookes). Firstly we saw a new, to the visitors, type of wooden earth fill dam which had only been constructed this year. Next a problem plantation of pines, planted in old pasture. The pines were well over the $3\frac{1}{2}$" D.B.H. and yet were barely 14 feet high. Pruning to 7 ft. when they were $3\frac{1}{2}$" D.B.H. would have been impossible and the branching was very heavy. What to do with them? I didn't hear any answer to solve this problem and quite frankly I don't think there is one without getting down to the basic facts of why the trees are growing in this manner. Just to cheer us up we were next shown a plantation on a steep rocky slope where there had been numerous deaths from lack of moisture on the shallow soil above rock. These deaths are inevitable in this type of country. One finds that as the trees grow there is increased demand on the limited moisture available. There was further discussion on road sub-division and fire control which as any forester knows can be very lengthy and so I leave it unsaid. Lastly foliage spraying of Eucalyptus suckers and prickle bush in Pinus radiata, planted 1961 was discussed. This was carried out three months previously with a 0.2% solution of 2.4.5-T in water with Agrol L.N., as wetting agent. The results were extremely good with approximately an 80% kill and the pines appeared to be healthy. On the return journey to Collie a stop was made to see a highly successful autumn clearing burn, so Stan Casson told us. (Heard later in the evening he had been in charge of the burn! !)

Back to Collie office about half past five, where unfortunately Dave Lejeune had to rush back to Kirup. However, that most excellent West Australian forestry custom of retiring into committee to discuss the events of the day was carried out. We were most fortunate in being able to use the saloon bar of the Victoria Hotel where a really interesting and enjoyable day was finished off in the right spirit and correct manner and forestry in Western Australia, in general, and Collie, in particular, discussed at length and put to right. This inter-Divisional visit was most enjoyable, our thanks to the Collie officers and I am sure everyone present learned something of value.