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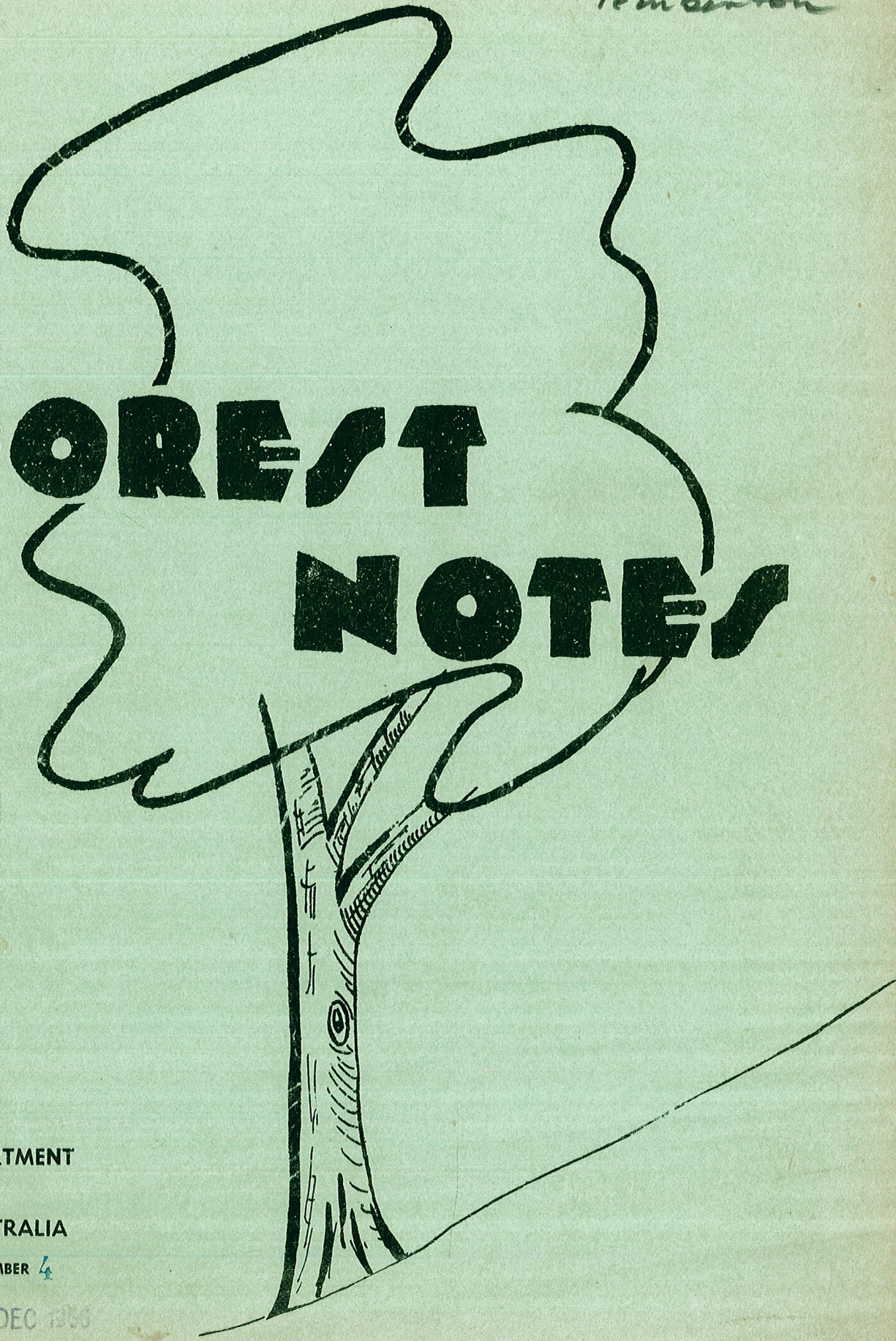
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FOREST NOTES

FORESTS DEPARTMENT
PERTH
WESTERN AUSTRALIA

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EDITORIAL

The Editors take this opportunity to wish you all the Compliments of the Christman season, with the hope that heavy rain throughout the South-West Land Division will fall on December 24th.

This year has brought a wider range of contributions for Forest Notes, but there are still many potential authors at ALL levels of seniority, who have yet to offer their support. See what you can do during 1967 to keep this publication functioning in the way it was intended, namely, as a readily available medium for all ranks to report on any aspects of their work which has interested them, and which may therefore be of interest to their fellow Officers.

MERRY CHRISTMAS FROM,

JOHN ROBLEY AND PETER HEWETT.

Co-Editors.

OBITUARYD. R. Moore

We record with regret the death of Mr. Don Moore on Sunday, 2nd October, 1966.

Don Moore was born on 16/4/1902, was a forestry graduate of the Adelaide University and had served as an Officer in the West Australian Forests Department for a period of 40 years and at the time of his death held the position of Chief of Division of Plantations. He was Chairman of the W.A. Division of the Institute for the period 1958-59.

Our sincere sympathy is extended to his family.



CHAIN SAW OPERATORS OPERATORS USING PLUNGE BOW TYPE BARS SHOULD BE ADVISED OF THE DANGERS WHEN CROSS CUTTING TIMBER OR LIMBS THAT WILL FALL AFTER BEING CUT.

AS THE CHAIN AND BAR PASS THROUGH DURING CROSS CUTTING ONE END OF THE TIMBER CAN AND OFTEN WILL FALL INTO THE BOW THEREBY DRAGGING THE SAW TOWARDS THE GROUND AND THE OPERATORS LEGS, MOSTLY WITH THE CHAIN STILL BEING DRIVEN. TOO MUCH EMPHASIS CANNOT BE PLACED ON THE DANGER OF THIS PRACTICE.

.....

NOTES ON FORESTRY OVERSEAS

by D.W.R. Stewart

- A. CANADA, with a land area greater than that of Australia is the one country in the British Commonwealth with forest resources greatly in excess of its needs. It therefore has a substantial export of both paper and timber, mostly to the U.S.A. Its area of productive forest is about 5/6ths the area of Western Australia.

The well forested province of British Columbia in the west is more than half the size of W.A., and as one third of it carries productive forest, its forest area is about eighteen times that of W.A. Along the west coast it includes Vancouver Island, which alone has nearly three times the forest area of W.A. It is of interest that 50% of the national income of British Columbia comes from forest products.

On Vancouver Island, the writer had the opportunity of seeing something of the logging and forestry operations of a Company whose activities were the mainstay of a town of more than 20,000 people, producing saw timber, pulp and paper. It was one of many such operations on the Island. The annual log intake was approximately 60% greater in volume than that of the combined intake for all sawmills in Western Australia. About half the intake provided saw timber and the balance, pulp and paper. The raw material came both from private land owned by the Company, and State Forest on which cutting rights were held under a "tree farm" licence.

The "tree farm" licence system enables a Company owning extensive forest areas to obtain rights to Crown timber on adjoining land with a view to the provision of raw material for a long period of years under systematic planning. It first requires that the Company puts its own land under sound management with working plans approved by the Forest Service and subsequently supervised by it, to ensure that conditions are observed and all cut-over forest is adequately regenerated. The Company is responsible for all fire control in both the State and private areas concerned and for their effective regeneration after logging.

RAINFALL ranges from 35" on some of the drier East coast sites to more than 100" in some west coast localities. Elevations range from sea level to 5,000 feet with a number of peaks above 5,000 feet.

The commercial species are mainly Douglas fir and Western Hemlock, with some Western Red Cedar and small occurrences of Spruce and Silver Fir.

The Douglas Fir occurs on the lower rainfall areas and Southern aspects, while Hemlock has a definite preference for the wetter sites towards the Western coast and the Northern and Western aspects.

OPERATIONS.

The bush camp from which operations were controlled and directed, was some 30 miles from the town. Of some 600 men employed there, 400 lived at the

camp, either as married men in suitable houses or single men in bunk houses with a communal mess. Some 200 men travelled daily from the township.

The terrain was rugged and mountainous, and had all been logged many decades ago by locomotives operating up the valleys, but a great deal of timber on the upper slopes (say above 2,000 feet) had been left, as well as some of the more difficult patches at lower levels. All logging was down to a long inlet which penetrated deeply from the West coast, and the logs were then floated in rafts to the processing plant. The present operation is all road logging with an intensive system of roads involving heavy side cutting, so located that the maximum snigging distance does not exceed some 15 chains to any selected yarding site. The high lead logging system is used, but it is no longer the practice to rig selected spar trees. A locally developed unit, the "Tyee logger" carries its own demountable steel spar, some 70 to 80 feet long which, with diesel engine and winches is mounted on a heavy tank chassis. This permits a wider and more flexible selection of yarding sites and rapid movement and setting up on new sites. The old whistle cord for signalling the winch operator is now a thing of the past, and the "choker-setter" signals the winch operator with a small portable transistor radio which gives a loud series of squeals in the driver's cab to a pre-determined code. This is readily heard above the noise of the machinery.

The Company cuts over some 24,000 acres per year on a clear felling basis. The average virgin stand yields some 240 loads per acre, while good quality virgin forest may yield up to 400 loads per acre. However, with many of the areas being re-logged, and areas of inferior forest, the overall average yield would be about 70 loads per acre.

Road construction costs are high, ranging from \$A22,000 to \$A27,000 per mile. Some 15 miles of road through the bush camp to the water-front are sealed with bitumen and the log road system feeds into this bitumen section. Approximately 30 miles of road per year are constructed by the engineering branch.

From the bush camp, the Company has some 30 odd log trucks operating continuously, plus 6 trucks run by contractors. These deliver some 3,330 loads per day to the holding pond in the inlet from which the logs are taken some distance to a sorting yard where they are sorted into species and classes of log before being made up in rafts to proceed up the inlet to the processing plant.

REGENERATION.

It is surprising to learn that despite the great difference in climate, topography, species, etc., the problems of regenerating the forest to the desired species have much in common with our own problems in the Karri forest. Abundant regeneration follows good seed years, but the forester is plagued by uncertain and widely spaced seed years, fire control problems, the need for a satisfactory seed bed, and the intense competition of weed species if early regeneration is not achieved. It is also surprising to find that about 60% of the area is re-stocked by artificial planting of the desired species raised in nurseries as two year and three year old stock. Slash burning is essential in advance of planting so that at least 60% of the cut-over area must have the slash burnt under careful control. Weather conditions limit safe and effective burning to relatively few days in the autumn after rains following dry sunny weather. Natural regeneration where successful also has its problems. It is usually greatly over-stocked, and at 8 to 15 years of age it is spaced out by hand to some 500 per acre at a cost of \$A15 to

\$A16 per acre. Where hand planting is effected, planters set about 800 plants per man day, at a spacing of 10 feet by 10 feet. It is of interest that penalties are provided where the Company fails to carry out the slash removal burns. It is something of the order of \$10 per acre for the first year, but if carried out during the second year, there is a partial remission of this, while if not done until the third year, there is an even smaller remission of the penalty moneys.

The controlled burning of slash under prescribed conditions was seen in October (cf. April here). Under the forest canopy the litter was too damp to burn. From a fireline cleared outside the standing forest, it was burnt downhill, making slow progress for several chains only. It would then be lit up next day from the next lowest road on the contour to burn uphill to the previous day's burn.

Usually it is two to three years after felling before planting is carried out. Weed control measures both by aerial spraying and ground spraying may be necessary, particularly for alder which readily takes possession of the site. Up to 6,000 acres per year may be so treated, of which perhaps 2,000 would be by helicopter and 4,000 by ground spraying. Following regeneration, unwanted seed trees may be felled or given a basal treatment with 2-4-D or 2-4-5-T. Where alder has taken possession in some of the earlier cuttings, its removal is deemed too costly and it is left in the hope that it can be used in the future, presumably as a pulping timber.

CONTROL

All the forest work is under the control of a considerable forestry staff, and the Company probably employs far more professional foresters than does the W.A. Government. Many are locally trained, while others are overseas graduates. The divisional forester of the Company is in close liaison with Officers of the British Columbia Forest Service whose duties are to ensure that the terms and conditions of the working plan and "tree farm agreement" are observed, that cut-over forest is adequately re-stocked, and that fire protection measures are to the required standard. For land outside the tree farm licence areas, there is a general forest protection tax of 6 cents per acre.

COSTS.

A few costs will be of interest. Wages and salary rates are high by Australian standards. Fallers, for example, would average some \$A44 per day, while the best fallers could make up to \$A60 per day. The lower paid worker in the bush area earns some \$17 per day, while men operating machines, hauling and loading logs would get from \$20-\$21 per day. It must be remembered that severe winter conditions may close down logging operations for two or three months of the year, so that actual earnings for 9 or 10 months must keep a timber worker for the full year, unless he can obtain other employment during the "shut down".

The cost of logs delivered at the plant is from \$A15 to \$A18 per load.

Felling rates average about A21 to A22 cents per load.

Royalty and stumpage figures were not made available but it was mentioned that companies holding and operating on 'Timber leases' paid three charges, namely an annual rental per square mile, a royalty of a small sum per 1000 board feet removed, and a stumpage. Stumpage appraisal was based on market price of the product at key markets, or at ports and was worked out in considerable detail for each company and

and area. The stumpage was by far the largest of the three charges levied, and would be comparable to our 'royalty' as the calculated value of the standing tree to the sawmiller.

EXPORTS.

The Company loads direct from the plant to its own ships, and despatches its produce world-wide. Much of it goes to the East of the U.S.A. via the Panama Canal, while lesser quantities go as far afield as the United Kingdom, Japan and Australia.

The forests of British Columbia have been a tremendous source of wealth and employment since the early days of settlement more than 100 years ago. As in Australia, early exploitation was accompanied by and followed by much waste and forest degradation. It was claimed that some 20 million acres of forest now remain unstocked as a result of exploitation, fire and neglect. It is only in recent decades that positive steps have been taken on a large scale for preservation and sound management of this immensely valuable forest estate.

NATURE'S AIR-CONDITIONING PLANT

P.H. Barrett.

Webster's Etymological English Dictionary (published 1895) defines EUCALYPTUS as follows:

EUCALYPTUS the "gun-tree", a large evergreen, native of Australia, which is beneficial in destroying the MIASMA of malarial districts.

The dictionary defines

MIASMAas infectious matter floating in the air arising from putrefying bodies.

MALARIA.....the noxious exhalations of marshy districts, producing fever.

"MANY A SLIP; TWIXT THE -----"

The following quotations are taken, "verbatim" from a 1966 Examination in Land Utilisation.

1. Important factors in farmland development

"The Retention of erosion. This is very important in certain areas."

2. Clearing Methods

"----- by clearing with a Ball and Chain himself."

3. Farm development

"The farmer would use the land not yet used, and so allow none of his farm to fall backwards."

4. Farm improvement - the Midas Touch

"The farmer then turns part of the land into sheep."

5. On stream gauging methods

"A Weir Board is set up to help farmers with their irrigation by supplying capital and giving advice-----."

6. "A leached soil must be left fallow for a period, to regain strength."

TRENDS IN FALLING PRACTICE

by P.N. Hewett

Mr. Holland's article in vol. 4, no. 3, concerning trials with a BOW blade on a chain saw, has suggested this short note on current trends in the use of chainsaws.

Makes and Models.

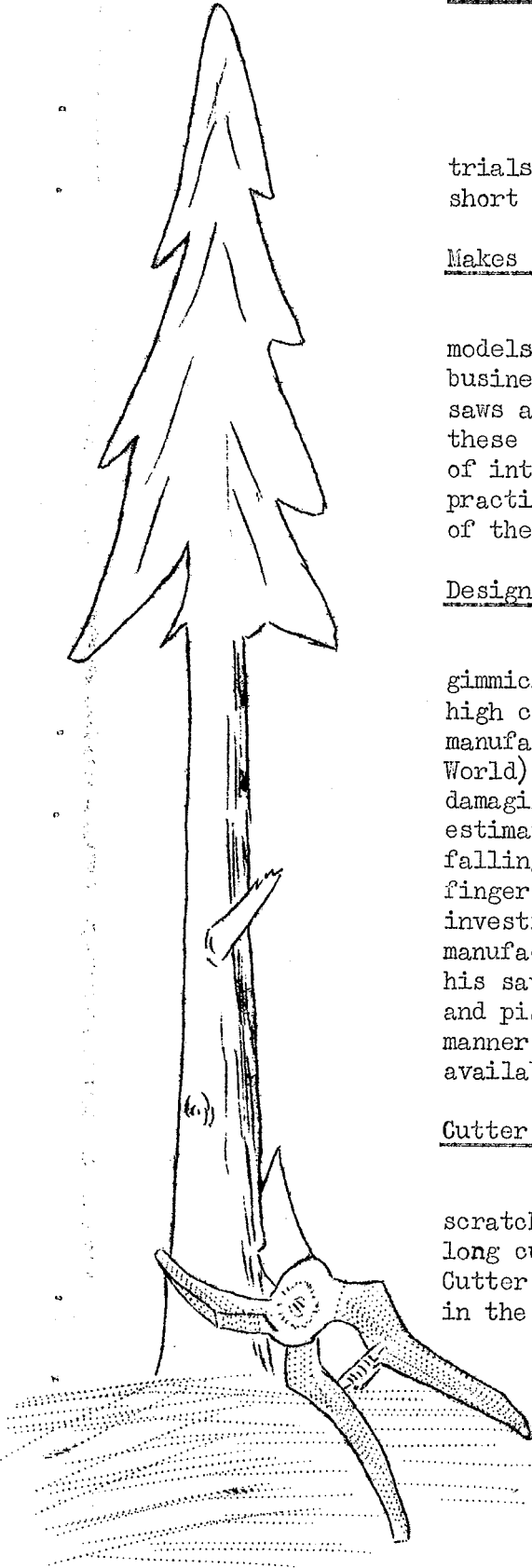
There are currently some 70 different makes and models of chainsaw available in Western Australia, and business is fairly competitive. Only about ten of these saws are generally acceptable to professional fallers, and these saws represent only four or five manufacturers. It is of interest to note that the chainsaw has now captured practically all of the dry firewood cutting market, in lieu of the powered circular saw.

Design.

Apart from the use of colours and chromium as sales gimmicks the design of all saws tends towards light weight, high compression, and high running speeds. (At least three manufacturers now claim to have the lightest saw in the World). These high speed, direct-drive saws often produce damaging High Frequency vibrations, and it has been estimated that at least 30% of regular operators in pine falling have a degree of trouble with nerve-ends in their fingers and hands. This "RANNAUD'S SYNDROME" is being investigated by a medical officer, but meanwhile, one manufacturer is selling an A-V (Anti-Vibration) handle for his saws. The A-V handle consists of a one-piece handle-bar and pistol grip which is mounted on rubber in much the same manner as engine mountings. Unfortunately, this handle is available for one model only and is expensive.

Cutter Bars.

The change-over from cross-cut saws and two-man scratch type chainsaws, resulted in the use of relatively long cutter bars on the first reliable one man chainsaws. Cutter bars of 36 inch and even 42 inch length were popular in the late fifties, even for small timber. The advantages in cost, power output, and operator fatigue when using a minimum length cutter bar, has gradually been appreciated, and the general trend is towards cutters of 30' in hardwood and 18" in pine cutting.



Nose-wheel cutter bars come and go, and since the demand for these is largely a matter of taste, they seem destined to persist for some years to come. Salesmanship plays its part in this particular sphere, and it is now possible to buy cutter bars with names such as 'Duo-Tronic', 'Roll-o-Tronic', 'Perma-Hard' and 'Speed Tip', together with Microguard, Speedguard, and Microbit cutting chains. Little wonder is it that some of these fallers change their saw as often as they change their brand of cigarettes.

Although they are not exactly new, the BOW type cutter bars are beginning to arouse interest. The retailers are rather slow to realize this, and although three major brand names will supply Bow blades in the Eastern States, a check around Perth, in late October this year, revealed that two of the three local distributors of these saws claim that bow blades are not made for their particular product.

The Bow blade is widely used in the U.S.A., and in many shapes and sizes, but these can be conveniently classified into either "PLUNGE BOW" or "PADDLE BOW" saws, depending upon the degree of circularity which they possess. It is interesting to note that a Paddle Bow blade has been in use on Mallet cutting at Dryandra for the past eight years.

WHAT'S NEXT...???

With the advent of tree harvesting machines in British Columbia, such as the BELOIT HARVESTER, the days of the chainsaw may well be numbered. It seems likely that within 5 years in the U.S.A., ten years in the Eastern States and perhaps twenty years in Western Australia, chainsaws will be replaced by a type of Secateur. This secateur, powered by a small hydraulic motor, could simply clip the tree off at butt and crown ready for tree-length snagging. Other alternatives are felling with high pressure water jets, which have already been used experimentally in the U.S.A. for sawmilling, or the use of a form of LASER BEAM, which is rapidly being developed for a wide range of peaceful uses.

Errata ...Vol. 4, no. 3.

Our attention has been drawn to a misprint in Mr. McCutcheon's article in the September issue. The paragraph on Method of Preparation should read as follows...

"Saplings were felled and docked in the bush by chainsaw, debarked with an axe ... mainly by shaving at that time of the year, and transported to H.Q. where pointing was most conveniently done by two men".

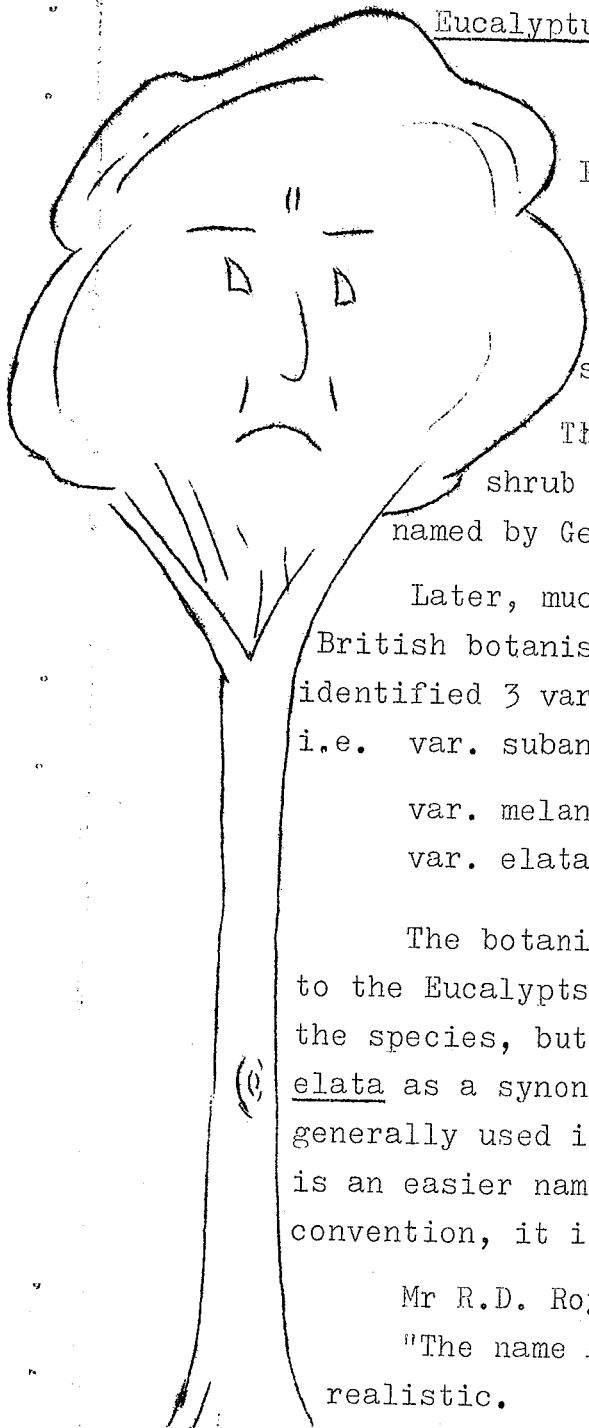
EDITORS.

WANDOOEucalyptus redunca var elata

or

Eucalyptus wandoo

A.L. CLIFTON



Periodically, the question of the right name for this species comes to our attention. Some research into this problem has brought a few facts to the surface.

The original Eucalyptus redunca was "a shrub or mallee 3 to 8 feet high" which was named by German botanist Schauer.

Later, much botanical material was sent to the British botanist, Bentham at Kew Gardens, London. He identified 3 varieties of this species.

i.e. var. subangusta (tree, 25 feet with persistent bark.)

var. melanophloia (small tree; black bark.)

var. elata (large White Gum 50' - 100' high; wandoo.)

The botanist Blakely (1934), in his book "A Key to the Eucalypts", gives the name "Eucalyptus wandoo" to the species, but quotes the name Eucalyptus redunca var elata as a synonym. Eucalyptus wandoo is the name now generally used in the Eastern States, and certainly it is an easier name to use than the other, but by botanical convention, it is not correct.

Mr R.D. Royce, curator of the State Herbarium says:
"The name Eucalyptus wandoo, Blakely, is not realistic.

"The differences between the mallee and the tree are very obvious, but in view of the other forms within E. redunca accepted by Blakely, and particularly in view of the overall variation in Eucalyptus, the creation of a

new species for a tree originally described as a mallee is not feasible. There are ^{nearly} a hundred species of Eucalyptus in this State which occur as both mallee and tree, and a few of these even have varietal names."

Botanical convention requires that the name applied with original description, if it was correct and accepted, should always be applied thereafter to that species or variety. Subsequent revisions sometimes reveal the need for a change in name, and while this often happens with Australian flora, Blakely's naming here cannot be accepted.

So the correct naming of this tree is Eucalyptus redunca Schau. var elata Benth.

It is also acceptable in general use to drop the "authority" - or shortened name of the describer vis Eucalyptus redunca var elata.

A THIRSTY JOB

Those of you who are called upon to inspect railway sleepers in shadeless mill-yards or at railway sidings, probably believe that you have a thirsty job. Just imagine the work of using these sleepers, as, for example, on the line built by Hamersley Iron Pty. Ltd.

Hamersley Iron's line building required 179 miles of Standard Gauge line, which involved 630,000 sleepers at the rate of 3,520 per mile .. i.e. at 18" centres.

Each sleeper measured 8' x 9" x 6" = 3 cubic feet per sleeper.

Total volume of sleepers = 1,830,000 cubic feet, or 10% of the total annual sawn output of Western Australia.

The rails weigh 119 lbs. per yard, and were welded into lengths of 1020 feet for track laying, or approximately 15 tons per piece.

Now that the line is in use, a total train load of ore will weigh 18,000 tons and will travel at 45 m.p.h. loaded and 60 m.p.h. empty.

Beer consumption during the construction of the line was calculated at 2,650,720 middies,

or 4.2 m.p.s. (middies per sleeper).

This really is thirsty work!

by P. Barrett

RAILWAY SLEEPERS

by D.W.R. Stewart

With the construction of the new Standard Gauge line between Perth and Kalgoorlie, and three iron ore railways in the North, sleepers have been in the news over the past two years, and it is thought that some notes on their use would be of general interest.

1. Standard Gauge Line - Trans Australia.

This takes a standard gauge sleeper 8' x 9" x 4 $\frac{1}{2}$ " which is a size supplied to the Commonwealth for its standard gauge line over a long period of years. In this instance, however, a considerable section of the line must carry 3 rails to accommodate both Standard Gauge of 4'8 $\frac{1}{2}$ " and W.A. 3'6" gauge traffic. This means that the greater part of the sleeper is potential rail seat, and therefore a high quality is called for, superior to that normally supplied.

2. Mount Goldsworthy Line.

This line which was completed nearly 12 months ago, is also of Standard gauge, using 8' x 9" x 4 $\frac{1}{2}$ " sleepers. This line extends some 70 miles East from Port Hedland. The spacing of the sleepers is 27" centres, i.e., 2,348 sleepers per mile, or a total of 164,360 for the 70-mile line. During construction, it was decided to decrease the spacing to 25 $\frac{1}{2}$ " which required 2,484 sleepers per mile, or an additional 9,680 sleepers. It carries heavy ore trains to Port Hedland.

3. Hamersley Iron Line.

This line has a length of some 179 miles and is built to the Standard gauge of 4'8 $\frac{1}{2}$ ". Because of the very heavy axle loads which it is designed to carry, heavy sleepers 8' x 9" x 6" are used with the close spacing of 18" centres. That is 9" sleepers with 9" spaces between. This requires 3,520 sleepers per mile or a total of 630,000 sleepers. The axle load of 30 tons is said to be one of the heaviest loadings used on any railway in the world. Train loads of up to 12,000 tons will be carried at a speed of 45 miles per hour.

4. Mount Newman.

The Mount Newman proposals which have been suspended for some 12 months are now in the news again and will involve the construction of some 218 miles of line. It is not yet known what dimension of sleeper will be used or what spacing, but again, because of heavy axle loads, it is probable the sleepers will be 6" or more in thickness and a spacing of 20" centres has been suggested. This line will require some 900,000 sleepers.

Production of sleepers for the above lines meant a great increase in W.A.'s normal output of sleepers and it was stated at one time in the Press that these were some of the world's largest present railway construction projects.

It is interesting to compare railway construction activities in China where, according to an article in "Unasylva" a vast amount of railway construction is taking place. China has some 21,000 miles of railway. It is constructing 1,250 miles per year. Its sleeper requirements are approximately 11,200 cubic feet per mile of line constructed, which compares with 10,560 cubic feet per mile for the Hamersley Iron Line. Service life is said to average only about 5 years; or 6 years if treated with Tung Oil. Termite damage is said to be severe. The annual timber requirements are set out as under: -

For new line - 1,240 miles.

For maintenance of line - 4,092 miles.

i.e., a total of 5,322 miles requiring approximately 1,200,000 loads of sleepers per year. This quantity is about $3\frac{1}{2}$ times the total annual production of the sawmilling industry in W.A.

"CHEMISTRY" OF WOMEN

"Thought to be a member of the human race, accepted at 120 lb. though known isotopes vary from 80lb. to 1,250 lb."

"Seldom found in natural state. Surface is usually coated with a solution of paint. Low boiling temperature and freezing point varies. Is highly explosive and dangerous except in qualified hands".

"Extremely active when in vicinity of opposite member of species. Chiefly ornamental, probably the most powerful seducing agent known".

"It is illegal to own more than one specimen although a certain amount of exchange is permissible".

From the "West Australian"

PINUS PINASTER IN THE HILLS

by A. L. Clifton

Within a 40 mile radius of Perth, we have practically run-out of P. radiata sites. Attention is now turning more to the planting of P. pinaster as a source of softwood in the hills country.

What sort of sites are available?

There are several. Firstly, it is well known that P. pinaster will grow on many sub-standard P. radiata sites in the river valleys of the hills. Secondly, based on experience on the coastal plain and at Gleneagle, pines will grow in a range of deep sands. Finally, with Gleneagle experience, it is found that P. pinaster grows well on the laterite silt areas. These are confined to drainage lines in the over 45" rainfall areas of the jarrah forest.

At present the minimum rainfall considered adequate for P. pinaster is 30" per year.

The problem of how to locate these sites is bound up in a knowledge of Land-forms; - the study of geomorphology. Much work has been done by officers of C.S.I.R.O. in the York-Quairading area and in other parts of Australia. The concepts used in this article lean heavily upon this work.

In 1952 C.S. Christian propounded a classification for country with a lateritic crust, giving it descriptive 3 categories.

They were

"Stable" *

"Erosional"

"Depositional"

These concepts fit very well into the northern jarrah forest zone.

The "stable surfaces" are where erosion has stripped all easily removed materials from the surface but is now hindered by a shield of massive ironstone which underlies most of the old soils of the area.

This "shield" is believed to have developed in the Miocene period, perhaps 3 million years ago. The old, undulating landscape of those times has been fossilised by ironstone and preserved with only slight modifications to the present day.

* In some official reports I have called this "Transitional" because it is between Depositional and Erosional.

This "surface" includes a number of minor land forms, which I don't intend to discuss technically; sufficient to say that the land is gently undulating, with broad, gently descending valleys, often containing bands of "laterite silt" *, one to five chains wide and associated with seepages and swamp vegetation. Gravel deposits and spillways are common too, with frequent massive laterite out-crop.

Jarrah dieback in the hills is almost exclusively confined to this land surface category.

Erosional Surface

As one goes down the drainage lines, the point is reached where the protecting laterite is worn thin, or even undercut by the erosion of running water. "Laterite silts" cease here; the slopes immediately next to the water course are steeper and there is a rapid improvement in soil fertility downstream. We have entered the Erosional Surface.

Let me digress slightly here to discuss the effect of Laterite.

The Ancient Laterite profile often extends for considerable depth, e.g. 100 ft. This profile has been impoverished by weathering;

its gravels are a poor-moisture-holding material;

its ironstone crusts are a barrier to penetration by roots;

its alumina layer is a sour zone, possible with toxic features (unproven); (This is the "mottled Zone" in the "Forest Soils" booklet diagram) and its pallid zone is a moisture-bearing zone with poor aeration. However, where the finer by-products of its breakdown accumulate, as laterite silt, sites hold some promise.

It is the stripping of the land surface, with truncation of the laterite profile, and exposure of country rock to soil forming processes that produces pine sites. This is well illustrated in the success of *P. radiata* on non-lateritic, red soils derived entirely from basic rock.

In between the extremes of undisturbed laterite and pure basic soils there are many phases of lateritic dissection, deposition of debris, recementation of debris, sorting of by-products, and so on. These effects are complicated by the varying ability of the underlying rock to release nutrients on decomposition, and by soil moisture ranging from being too wet to too dry. The term "erosional surface" thus embraces a complex continuum; some places will be good sites, others very poor.

Techniques are being evolved to define more precisely the productivity of these sites for *P. pinaster*.

Physiographic characteristics of this surface are steeper slopes, intensely tortuous contours, many drainage channels, well defined ridges, outcrops of country rock and erosional cusps. ** Erosion products are removed from the scene via drainage lines.

* C.S.I.R.O. men are now calling these "yellow earths", even though some are more red than yellow.

** These appear as scooped-out areas on aerial photos.

It is in this region of dissection that *P. radiata* sites are found (and plenty of sub-standard sites too).

Since the undercutting of the laterite crust is extending inland from the scarp edge, the major occurrences of this erosional surface are associated with the main drainage lines in the western part of the jarrah forest. Also, as these areas are nearest the metropolitan markets, and include existing plantations (Mundaring Division) they are receiving considerable attention with the view to extending *P. pinaster* plantations.

It is found that if the underlying fresh country rock is accessible to roots, heavier degrees of lateritic contamination are acceptable. Also lower standards of fertility can be effectively utilised. Moisture supplied in the limiting factor on sites consisting of shallow to hard clay, sheet rock, or massive secondary laterite.

Depositional Surface

Inland, stream beds are not so deeply incised, there is less rainfall and erosion products tend to accumulate in drainage lines, instead of being carried away. Consequently there are large deposits of sand in the 20 - 35" rainfall belt. These areas are referred to as the "Depositional Surface". Contributing to the quantity of erosion-products is the presence of a series of eroding granitic hills which rise above the general countryside (monadnocks). Eagle Hill, Mt's. Vincent, Cuthbert etc. are examples, though these do occur in a higher rainfall area than their smaller unnamed Mundaring counterparts.

The characteristics of this surface are a lack of well-defined watercourses; widely spaced, flowing contours; sand filled, flat valley floors; long gravel "Spillways" (Gently sloping deposits of gravel). Sand deposits of unknown origin also occur on interfluves * and gully-heads in this land-form category.

It will be readily seen that a large part of the Depositional Surface will be unacceptable as current thinking allows planting only to the 30" rainfall isohyet.

Summary

Increasing necessity to grow more *P. pinaster* has led to the investigation into extension of hills plantations with this species. Landform classifications in the hills areas is the key to site selection. This classification consists of "Stable", "Erosional", and "Depositional" Surfaces. Each is able to grow *P. pinaster* on distinctive, restricted sites.

Within the Stable Surface, only narrow belts of swampy "Laterite-silt" are available.

Within the Erosional Surface, sites similar to those required for *P. radiata* are to be used, but a lower standard of fertility and greater lateritic contamination are acceptable.

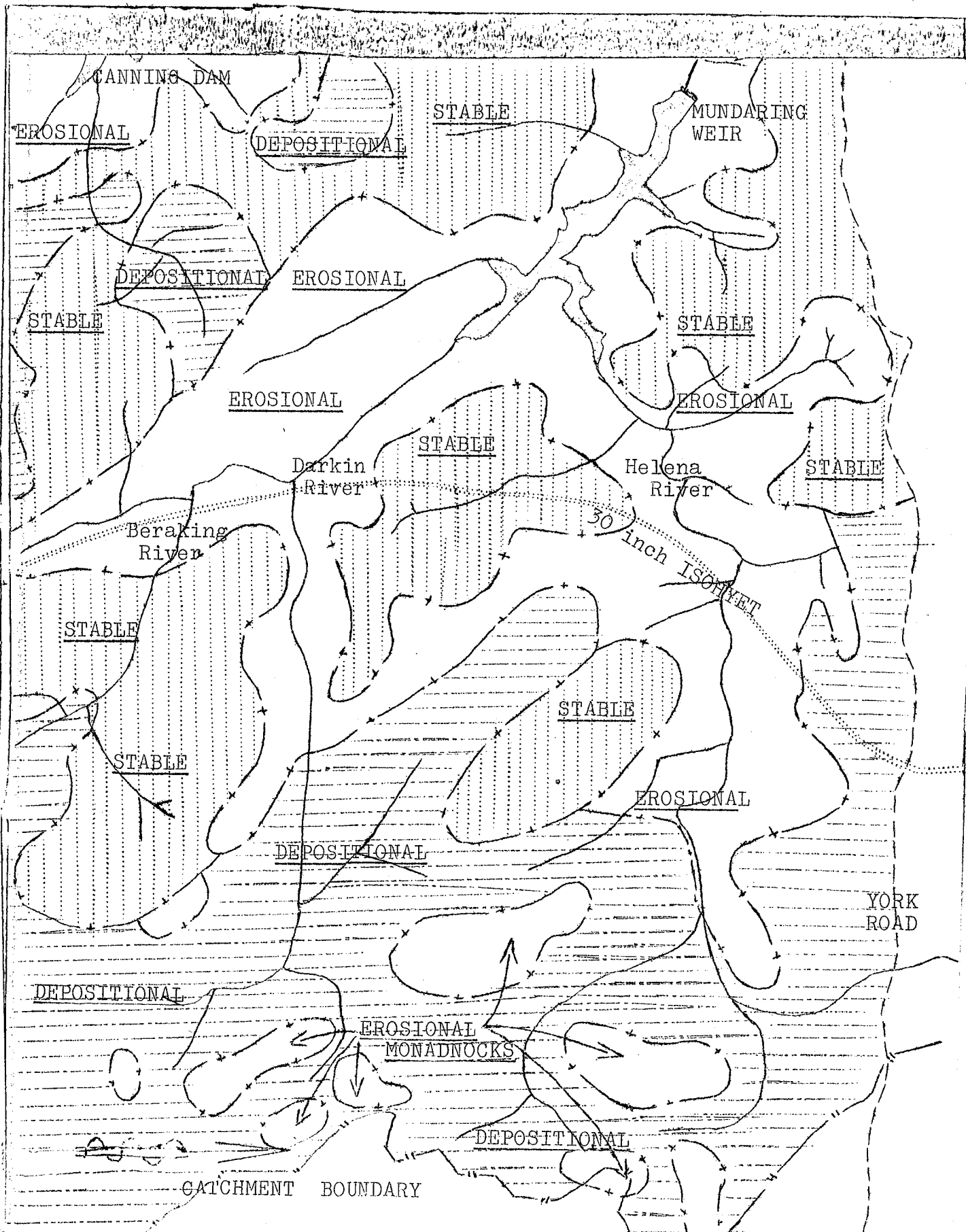
Further details on the requirements of *P. radiata* in relation to dissection of laterite are discussed in my dissertation.

References:

Clifton, A.L. - Soil surveying for *P. radiata* in W.A.

W.A. Forests Dept. Instruction Booklet. "Forest Soils". Chapter 7.

* Interfluve = boundary between watersheds.



DIAGRAMMATIC MAP SHOWING 3 LAND-SURFACE TYPES, MUNDARING

SEASONAL TRENDS IN SCRUB MOISTURE CONTENT

by J. McCormick

During the summer of 1965-66, a study was made of the variation in moisture content of five scrub species. This study was carried out during the period from September 1965 through to March 1966, sampling being done weekly at 0:900 hours on each sampling day.

The species studied were, *Lasiopetalum floribundum*, *Acacia pulchella*, *Phyllanthus calycinus*, *Dryandra nivea*, and *Bossiaea aquifolium*. Of these species, only *Phyllanthus calycinus* gave atypical results because of the tendency for this species to be deciduous at this time of the year.

The samples collected showed no sustained significant drying trend throughout the summer period, as will be seen from the graphs, but the following comments on individual species will help to explain the apparent changes in moisture content for each species.

Lasiopetalum floribundum.

This plant exhibited new leaf formation from September to November, and thus the moisture content remained almost stable.

Acacia pulchella.

A partial leaf drop occurred in September, just before flowering commenced. From October onwards, new leaf development took place, and by the end of January, moisture content began to fall.

Phyllanthus calycinus.

This plant bears a healthy leaf flush in Springtime, but sheds its leaves throughout the dry season, until in late February, few leaves are evident, save on the growing tips. This factor is, no doubt largely responsible for the long drying trend indicated by the graph.

Dryandra nivea.

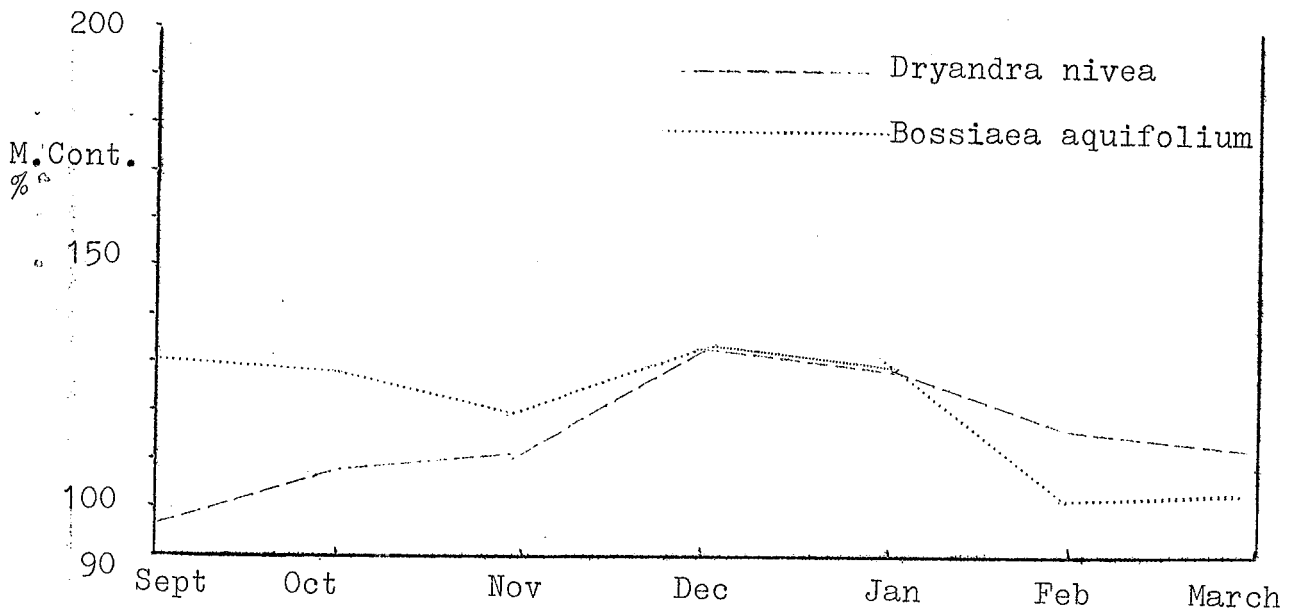
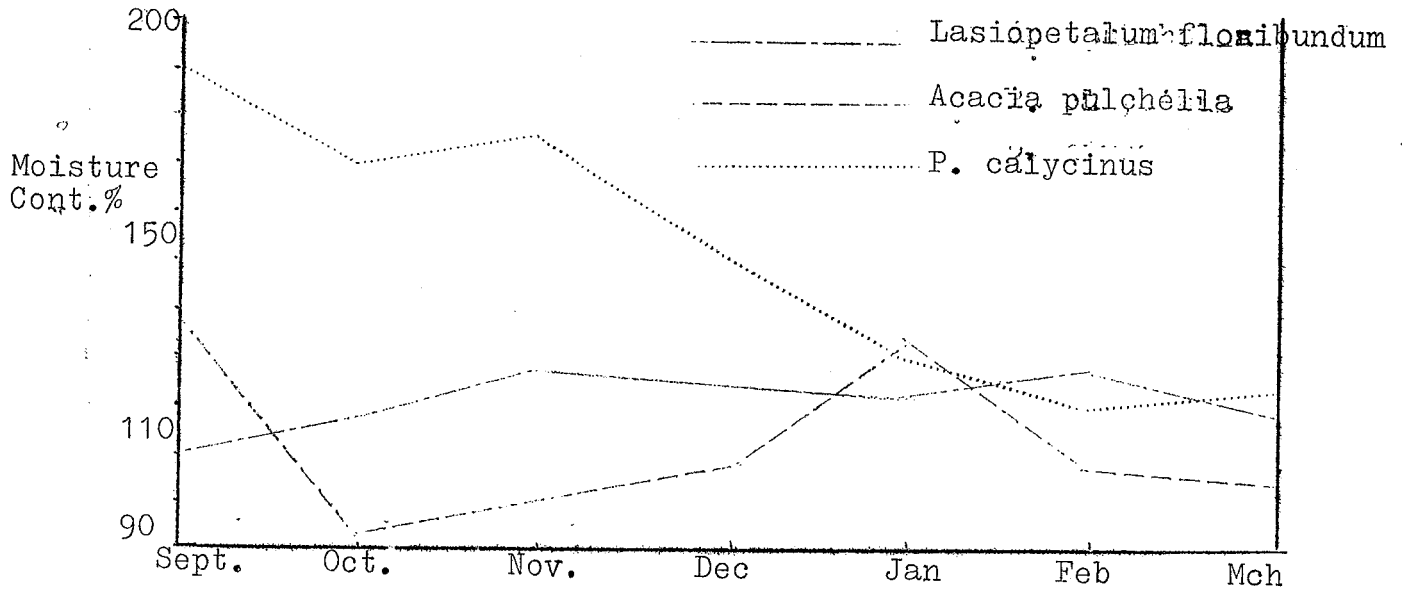
This species also has new leaf formation during the period from September to November, thereafter a slow drying trend is indicated by the curves.

Bossiaea aquifolia.

A thinning out of the leaves was observed from October to November, followed by new leaf formation in late November and in December. After this leaf growth ceased, a drying trend is indicated by the graph.

Conclusions.

Each of the five species sampled indicate, to varying degrees, that some form of Moisture Content Drop does occur from the December-January period, and from such information as has been gathered, it would appear that during the Autumn burning period, the moisture content of the scrub types considered might well be lower than in any other season.



ASEXUAL REPRODUCTION OF PINUS RADIATA, D. Don.An Advanced Technique

by L. G. Brigden

On 2.5.66 a number of *P. radiata* plants aged 1 + 0, were planted in an experimental plot at Lewana. The experiment involved the dipping of the roots of the plants in a clay slurry but this treatment in no way could have influenced what follows.

On 27.9.66 the plots were visited, and it was found that a few plants had been nipped off about one inch above ground level. The nipped off piece of one plant was noticed to be still green and on examination, it was observed that a callous had developed at the eaten-off end, and root buds were developing. None of the piece was covered by soil.

Had the possible rarity of this been realized (an immigrant and an alien found it) the piece would have been transferred to a nursery for care and observation. Instead, a hole was made with a stick and the piece placed therein. Should it still be alive at the next visit, it will be brought in for establishment in the Collie nursery, and its progress recorded.

Lines: To a West Australian Forester Abroad

(G.B. in Pakistan)

Most men choose the bustling cities din
 Shunning the quiet places of this land;
 Few more valiant heed the call of war
 And go with thunder to Valhallas' halls;
 Yet nearer to the gods are they who go in peace
 Who tread the alien shore
 Who from the dust of crumbled empires
 Raise the tall eucalypt, Australia's pride.

J. McCornick