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FOREST NOTES

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EDITORIAL

Vol. 4, No. 2 June, 1966

We wish to express our thanks to those people who have responded to our plea for help with articles for this issue.

However, there is no cause for complacency and we still require assistance, especially from those of you who have yet to register your first article in Forest Notes.

To assist those of you who think that there are no topics which you can use as the basis of an article, please refer to the following list of suggestions:-

Damage to Pine Plantations - birds
- animals
- insects
- fungus.

Nursery Problems.
Clearing Burns.
Treemarking for Cull Falling.
Advances in Pruning Technique.
New Logging Equipment - F.D. or Private
Chain Saw Performances.
Mechanical Scrub Control.
Karri Top Disposal.
Roading in the Deep South.
Minor Forest Produce - F/Wood
- Beansticks.
- Scout Staves.
Fire Detection - Auxiliary Towers.
A.P.I. Interpretation Assessment.
Bank Measurements in Hardwoods.
Stand Description in A.P.I. Classification
Topo Surveys - Field Work.
- Office Computation.

P.N.Hewett & J.A.W.Robley.
Editors

OBITUARY

George Wallie Marshall Nunn

We record, with regret, the death of George Nunn in late March of this year. Mr. Nunn was in his 68th year, having retired from the Forests Department in November 1963.

His life was active and varied and he excelled academically as well as in the sporting field. He was educated at Scotch College, where he was champion athlete in 1916, at the University of W.A., University of Adelaide, Australian Forestry School and at Royal Military College, Duntroon.

He served as a staff officer in India in 1921-22 and as an officer with the second AIF in World War 11 where he rose to the rank of Lieutenant Colonel.

His career with the Forests Department commenced in 1925 and continued to 1963 with absences in 1940 to 1944 for Army Service and 1946-47 when he worked for the United Nations Relief and Rehabilitation Administration in China.

George will be remembered for his work in the fields of management and plantation development, and for his intense, analytical approach to the science of Forestry.

He will also be remembered by those who worked closely with him, and whose understanding of forestry is greater because of this association.

ARE STATISTICS NECESSARY?

by J. McCormick

Some two centuries ago a discovery ship sailed along the north coast. It sailed on day after day beneath a hot sun without finding any trace of human habitation until one morning on rounding a headland a tribe of aborigines was sighted on shore. The ship hove-to and a longboat was cast off; its bearded crew pulled for the shore but before reaching the breakers, the natives, who until this time had watched the proceedings with curiosity, took to their heels and made off inland across the treeless waste. On seeing this, the sailors, either because of their inherent sporting instinct or in the cause of science and hoping to bring down a few biological specimens, opened fire with muskets. Owing to their indifferent markmanship the aborigines got clear and were soon out of sight.

After beaching their craft, the seaman searched along the shore hoping to find some evidence of the tribes existence but found nothing save some particularly large footprints in the sand. These were measured and the measurements were duly recorded in the ship's log.

In time the news got back to England that in this strange land there existed a tribe of natives whose perpendicular extremities were three feet long. Soon all the biological societies in London were abuzz with the news, after which followed much argument and scientific deduction on how and why these people had such large feet. How they came to have such large feet was never discovered for neither the Natural Selectionists or the Creative Evolutionists would give way on the matter; however, the reason for this phenomena was obvious and all the learned gentlemen were agreed on one point. The results were duly published in an illustrated magazine of that period along with a pen sketch of a black man lying on his back with his legs held vertically in the air, his feet of course acting as a sunshade.

It is obvious that the subscribers to this magazine believed what they read in it, after all, there was the evidence and with learned backing. Furthermore, they had not been aware of the existence of that strange animal, the kangaroo.

We are no less gullible than were our ancestors of two centuries ago, else the present mode of advertising would have long since gone out of date. I refer of course to the guarantees handed out by manufacturers of television sets, motor cars, patent medicines etc. which appear daily in the press. The classic example of this art is in the familiar advertisement for the tonic 'Viturin' which the makers claim will abolish Comptons Complaint; that dreaded ailment all too common these days, the major sympton of which is a slow pulse. The first thing we see in the advertisement is a bottle of the said therapeutic on whose label is enblazoned the word'Viturin' in large print. Next come the claims of the manufacturer; the dosage and thence the list of contents. The latter reads like a greek lexicon and is the present day substitute for the old word, abracadabra. Beneath the bottle there is a series of pictures. In picture number one, Fred Smith is shown in his wheel-chair looking as if all were not well with the world, as well it might be, for Fred has Comptons Complaint. However, all is not lost, for after one bottle of 'Viturin', Fred can stand up, after two bottles he can walk, after three bottles he can run and in the final picture, Fred is seen in a much improved condition leaping over a five-barred

If this were not proof enough we are then presented with a little graph which shows the rate of Fred's heartbeats as he returns to normal health. Now this graph has been rigged by the simple method of widely spacing the numbers on the Y axis which represent Fred's heartbeats and bringing together the numbers on the X axis representing the number of days since he began the treatment; with the result that our invalid's return to normal health appears to have been almost instantaneous.

Among those who do not believe in this sort of thing there are many who say "You can't believe statistics", or words to that effect; whereas the fault lies not in statistics but in the people who misuse them to their own advantage.

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EVOLUTION OF PINUS RADIATA SOIL SURVEY IN W.A. - 11.

by A.L. Clifton

An earlier article in "Forest Notes", vol. 2, no. 3, proposed a new system of classification for P. radiata land. This system has now been tried out in 8 surveys in 5 divisions since then and found to be a more realistic guide to land values.

Briefly, the system uses six grades (A - F) to identify site productivity ranging from excellent to useless. The old "genetic" associations have been retained - i.e. "basic", "acidic", "metamorphic" and "lateritic" - denoted by haching on soil plans as before. These associations often cut right across the range of suitability, but are retained as a useful guide to physical conditions, e.g. for roading. They are also useful for those not accustomed to the new approach.

The table below shows the new system.

Suitability for P. radiata.

Qualitative Productivity gradings	Symbol used for each grade	Approximate quantitative equivalent (Site Quality)	
Excellent	A	1 - 11	(Normally basic and
Good	B	111	(metamorphic soils.
Satisfactory	C	1V - V +	Best acidic soils rarely above this grade
Doubtful	D	Low V & poorer	
Submarginal	E	Probable failure	
Unsuitable	F	Certain failure	

It seems that 5 grades would have been enough because there is little call for the separation of a probable failure "from certain failure", and considerable extra work is required in the field to make this separation. In practice, the Grade "F" is rarely applied.

The system of using large dots for doubtful areas and "crossed dots" for unsuitable areas has been dropped, as the grade symbols cover this adequately, and the "plantable limit" boundary is a further guide.

Each plan produced has an adequate legend to guide the reader.

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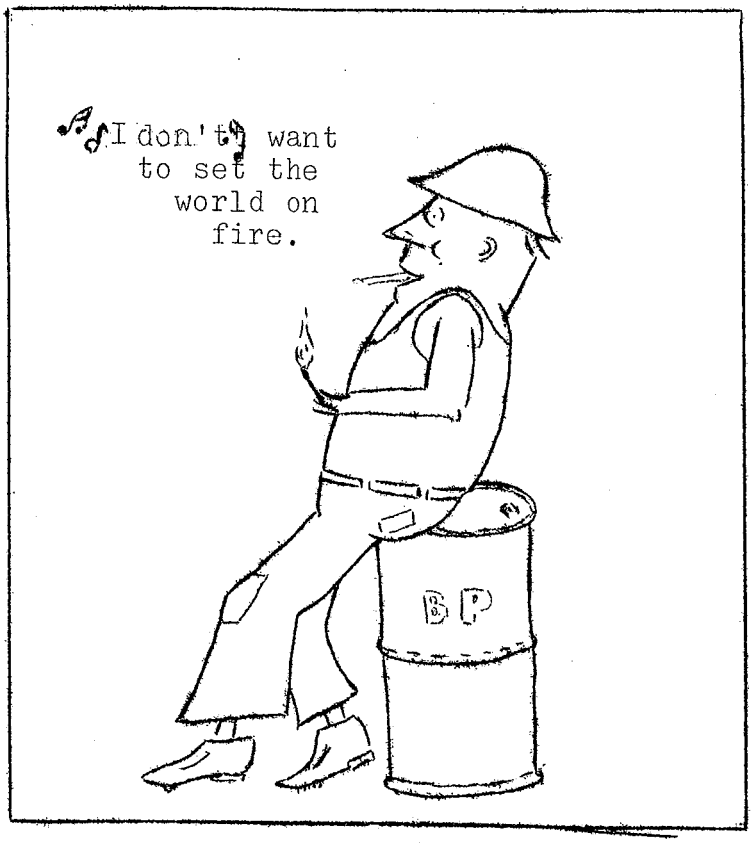
SAFETY POSTER



"CANDIDATE FOR THE HOT SEAT"

CONTROLLED BURNING FROM AIRCRAFT

by G.B. Peet

Introduction

In recent months controlled burning from aircraft has received publicity here and in the Eastern States. This project received considerable backing from the Forests Department, and other authorities are expressing interest in the method.

The method was developed by C.S.I.R.O.'s Bushfire Research Section, and with the assistance and enthusiasm of Shannon and Nannup Divisions considerable progress in development of the technique was achieved last spring. With further experimentation the method has excellent possibilities of developing into a valuable means of lighting area controlled burning.

After the experiences of last spring C.S.I.R.O. are devoting considerable effort to improving the incendiary and ground marking apparatus. A similar effort will be required from Divisional and Fire Control Staff in preliminary planning and preparation of areas, if the method is to prove a success.

Some of the requirements of preparation and planning of aircraft burns are discussed here, together with aspects of technique and apparatus of general interest.

Aircraft

The aircraft selected for incendiary dropping is a Cessna 337. This is a high-winged, push-pull, twin engined type, with a safe minimum cruising speed of about 100 knots.

The cabin holds six seats of which the two middle ones are removed to hold the incendiary apparatus.

The purchase cost of this aircraft is about $50,000 and the hire rate is $50 per hour.

The cost of lighting, which includes aircraft hire and incendiaries, approximated 7½ cents per acre last spring. With stand-by delays from poor burning weather this cost could easily double.

D.C.A. regulations covering this operation have been compiled. These cover choice of pilot, communications and flying restrictions.

Incendiary Apparatus

The incendiary apparatus is fixed to a metal frame connected to the left hand middle seat-runners. The frame holds a tank of ethylene glycol connected to a syringe and an electric timer. The electric timer is set to the required spot fire distance and activates a metal plate at a set time interval. This is the signal to eject the primed incendiary down a tube passing through the base of the aircraft.

The incendiaries consist of a plastic tube 1½ inches in length and one inch

in diameter. This tube holds 5 grammes of potassium permanganate and three fusee matches.

To prime the incendiary 1½ mls. of ethylene glycol is enjedted into the tube from the syringe. This mixes with the potassium permanganate and produces an intense heat reaction after about 20 seconds. The reaction ignites the fusees which in turn light the plastic tube and the whole burns for about two minutes. The reaction time is ample to allow the incendiary to reach the ground before lighting.

Mr. Packham of C.S.I.R.O. who designed this apparatus is at present working on a semi-automated model to eliminate part of the hand priming and handling of incendiaries.

Aircraft Crew

The aircraft crew consists of the pilot, observer, bombardier and controller. In brief their duties are:

(a) Pilot. Responsible for aircraft safety, maintenance and flying techniques.

(b) Observer. Assists the pilot with gyro corrections for maintaining his flight paths and stops and starts the bombing.

(c) Bombardier. Operation and maintenance of incendiary apparatus.

(d) Controller. Assists the bombardier and controls the operation with the air to ground wireless link.

Divisional staff have been used in both the controller and bombardier positions.

Ground Marking

The term "flight lines" corresponds here with normal lighting strips. The start point of each flight line is marked on the ground with something visible to the pilot. In the past hydrogen filled balloons were used but these are difficult to manage and frequently burst. Flares appear more promising.

Mr. Packham is working on an A.D.F. system for grcund marking. This consists basically of a small transmitter on the ground on which the aircraft homes with its radio wave direction finding apparatus.

The flight lines last spring were flown into the wind and areas were lit in two parts. (refer "West Australian" report). This method created problems in visability and turbulence from smoke. Attempts were made this autumn to fly the lines across wind, and if this can be developed it should produce a more satisfactory method of lighting. The main problem in flying across wind is determining the amount of drift in the flight line from varying wind velocity.

Prior Preparation

On 10 chain wide flight lines the aircraft will light at a rate of about 3000 acres per hour and cover approximately 10,000 acres per day with time for the spot fires to burn out. These rates provide ample warning of the degree of planning and preparation required to keep these burns under control.

(a) Tracks

Boundary tracks around areas proposed for aircraft burning must be trafficable. This is essential for rapid movement of suppression forces and to allow markers to change position quickly. It is pointless including areas for aircraft burning where this requirement cannot be fulfilled.

(b) Edging

The rapid rate of lighting makes prior effective edging a necessity. Moving the aircraft from Division to Division is costly as separate organisations have to be set up, and there are high stand-by costs on the aircraft. It is desirable that any one Division prepare for several continuous days of lighting without major problems from escapes. Both Shannon and Nannup have already demonstrated that this is possible, even in difficult forest types.

(c) Flight Plans

Each area for aircraft burning requires a flight plan. This shows the equivalent track distances that markers must move to maintain 10 chain widths between the flight lines.

Flight lines of less than 10 chains in width may be difficult to maintain except over short distances because of flying problems in maintaining direction within very fine limits. It follows then that areas selected for aircraft burning should be capable of accepting the Green or Blue scorch height specification shown in the controlled burning guide.

In general flight plans should be prepared for Easterly and Southerly winds, orientating the flight lines across the wind. These plans are prepared by marking the flight lines on a plan and measuring the equivalent track distance. The start point of each flight line is marked on the ground. The first marking point will be 10 chains equivalent distance from the downwind flank of the area, and thereafter moves will be at 20 chain equivalent distances. The opposite marker will move at 20 chain equivalent distances. This procedure is explained on figure 1 on the following page.

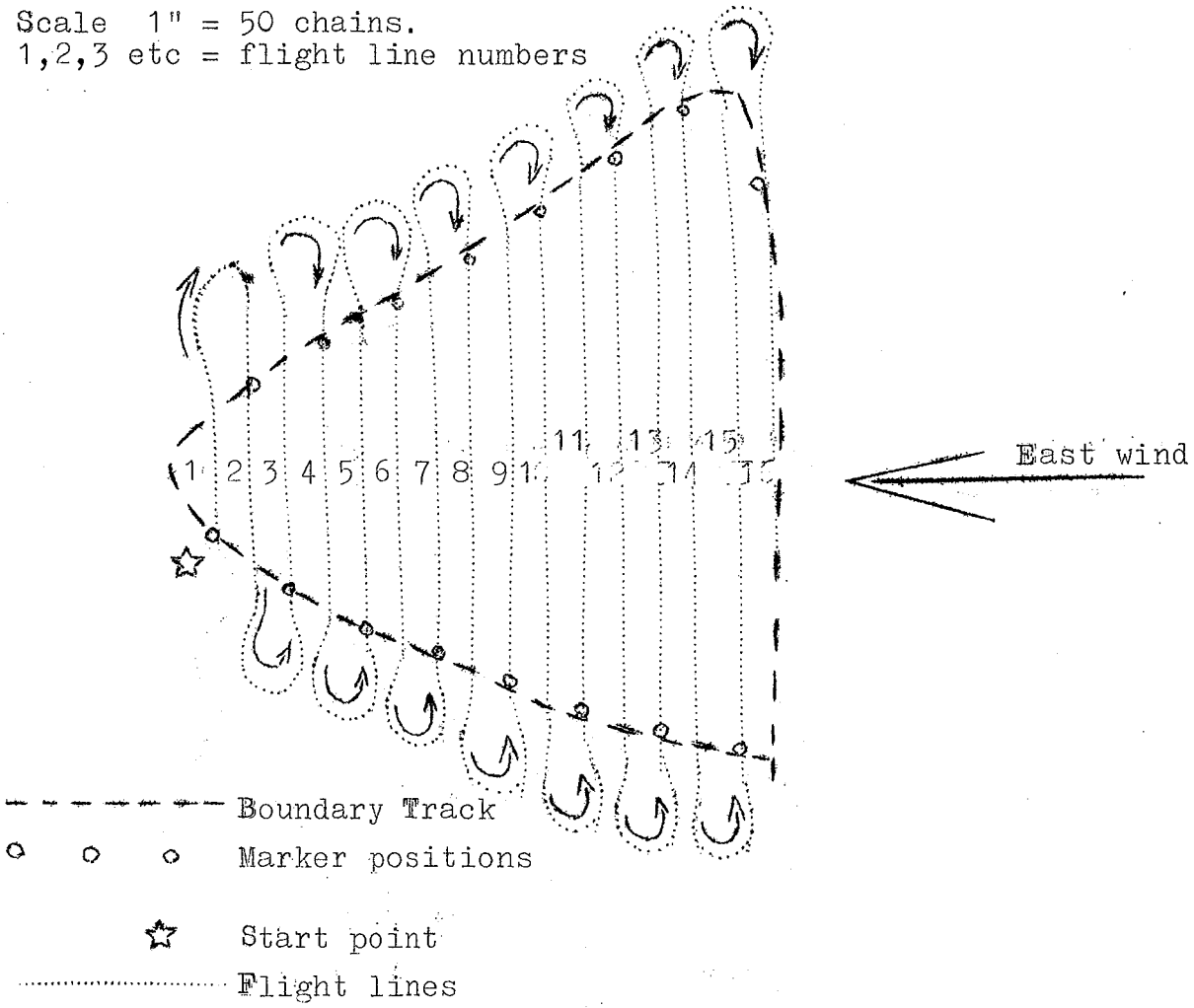
(d) Inspection

Normal prior inspection reports are required for aircraft burning. It is important to ensure that litter cover is complete. The incendiaries cannot be placed at the best point for lighting and uniform and complete fuel is required for an adequate take of spot fires.

(e) Personnel and Stores

Aircraft fuel, oil and pump should be at the airstrip from which the aircraft will operate. It is desirable to hold incendiaries and marking equipment at Divisional headquarters to minimise delay when moving from one area to another.

Divisional staff must be fully trained in aircraft procedures, especially the markers and crew members. The local organization must be geared to move quickly once the aircraft arrives, as delays result in high hire costs and patchy burns.



Comment

Although the requirements of aircraft burning may appear arduous the method shows considerable promise. In some areas it appears to be the only practical method of implementing and maintaining rotational controlled burning regimes. Some requirements may alter as techniques develop but the principles of planning and preparation are unlikely to change markedly.

A LONG WAY TO GO

by A. Kesners.

Any reader of current forestry and forests products journals and news letters will be impressed by the volume of articles published dealing with the research and experimental work of local, plantation grown pines and their products. All aspects of these species - their mechanics, seasoning, preservation, utilisation, etc. are the subject of continuous investigations with the one object in mind - to learn more about the properties and application of this timber in order to provide it in a condition best suited to its ultimate use.

Apart from the scientific as well as utilisation values of this work, it is also of considerable national importance. With a constantly growing population, it is becoming increasingly important for us to use a greater proportion of our locally grown pine where hardwoods can be supplanted, and reserve these as much as possible for export. Much has been said and written by competent authorities on this subject, and although our scientists and research workers have provided us with reliable information of the qualities and possible applications of local pine products, it is still largely a question of educating the population to accept their evidence and to overcome a decided preference for hardwood timber.

But just how much are we doing towards this? The reader of our Australian and New Zealand timber journals gets the impression that the timber trade as a whole is whole-heartedly behind this trend. New grading rules are being adopted, different trade associations engage in active promotional work, create trade marks, call conventions, arrange festivals, dinners and exhibitions.

But again - just how much of all this has got through to us, here in Western Australia?

The other day I called at the yard of one of our bigger timber firms in Perth. I had promised a friend who intends to build a house, to assist with the working out and selection of building materials. When, inter alia, I inquired about pine flooring, the salesman gave me a strange look: yes, they had local pine flooring, but he most certainly would not recommend it. Why? Simply because it was not strong enough and therefore needed extra support. Although the flooring was slightly cheaper, the whole job would become dearer on account of the extra joists needed. Pine also had a lot of knots which tended to fall out, then of course there were the white ants. Quite frankly, anybody who used pine flooring was not quite in his right mind. When I further inquired about pine mouldings: "Sorry, don't stock them, wouldn't be much good anyhow, buckle too much, you know." If we preferred a light-coloured wood, however, he could offer these in aloes-wood.

To test the issue further, I then proceeded to make similar enquiries at five other large metropolitan timber yards. At one of these the representative stated that they did not handle any local pine products, and he would not be drawn into making any comments regarding their suitability. To sum up the other four: mostly no pine flooring in stock, generally because it is "no good" - absorbs moisture in winter, not white ant resistant, has knot holes, not strong enough, does not last, twists. None of the six yards stocked pine mouldings; where comments were given, these were very similar to those made in respect to flooring. In most places

however, hardwood and imported softwood mouldings were offered as an alternative.

One exception in regard to pine flooring was the firm which sold manufactured pinus ply squares, treated against termites, and at a competitive price compared to jarrah T & G.

It seems we have a long way to go yet.

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NOTICE TO ALL EMPLOYEES

Due to increased competition and a keen desire to remain in business, a new policy to be effective immediately is to be instituted.

Somewhere between starting and quitting time, and without infringing too much on time usually devoted to Lunch Period, Tea Break, Rest Periods, Story Telling, Ticket Selling, Vacation Planning, and rehashing of last night's TV programme, each employee is to endeavour to find some time that can be set aside, to be known as "THE WORK BREAK". To some this may seem a radical innovation, but it is honestly believed the idea has great possibilities. It can conceivably be an aid to steady employment and it might also be a means of assuring regular pay cheques. While the adoption of the "WORK BREAK" is not compulsory, it is hoped that every employee will find enough time to give the plan a fair trial.

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FIRE HAZARD RODS AND P. PINASTER FUEL MOISTURE CONTENT.

by J. McCormick

One of the problems encountered in burning under P. pinaster is in knowing instantly the fuel moisture content. It does appear that a method of indicating this factor can be arrived at by the use of the standard fire hazard rod set. At Dwellingup an experiment has been established with this end in view and the results to date are encouraging.

A fine gauge brass wire basket was made 3" deep and 9" square. This was filled with P. pinaster needles and placed in semi-shade on a bed of P. pinaster needles. Beside this basket was placed a set of P. radiata fire hazard rods. The moisture content of both the pine needles in the basket and the fire hazard rods was reduced at two hourly intervals throughout the day.

The three drying trends illustrated were taken on the 13th, 14th & 15th April '66 one day after 85 points of rain and the Temp./R.H. ranges from 8 a.m. to 4 p.m. were -

		Temp.	R.H.
Fig. 1	13th April	41° - 62°	100% - 56%
Fig. 2	14th April	42° - 64°	100% - 73%
Fig. 3	15th April	48° - 71°	100% - 49%

From these three daily samples the drying curves for both the P. pinaster needles and the fire hazard rods are markedly alike. The difference in moisture content decreases with the drying trend.

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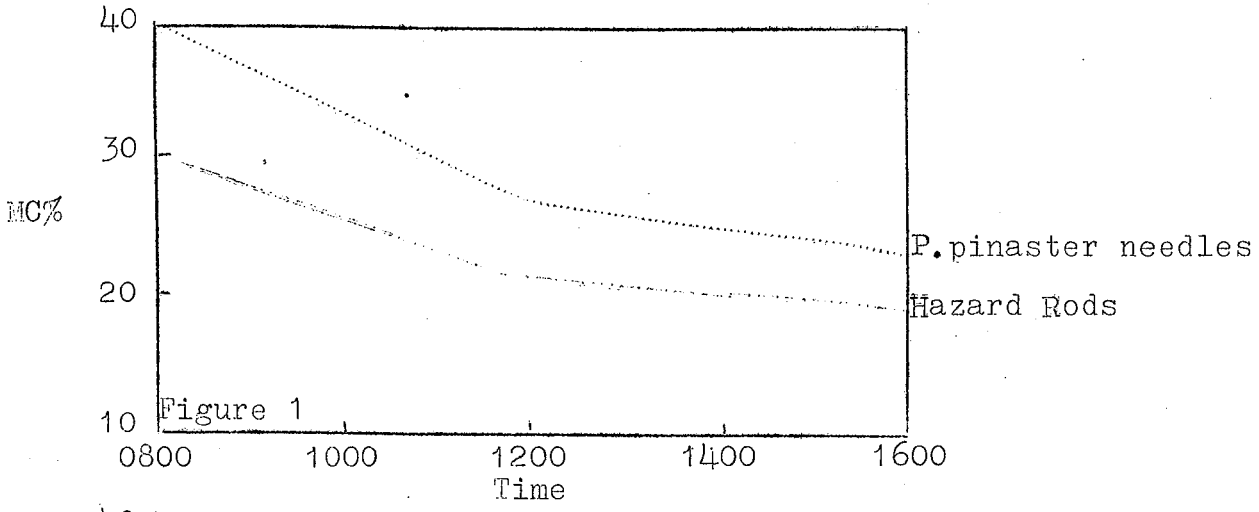


Figure 1

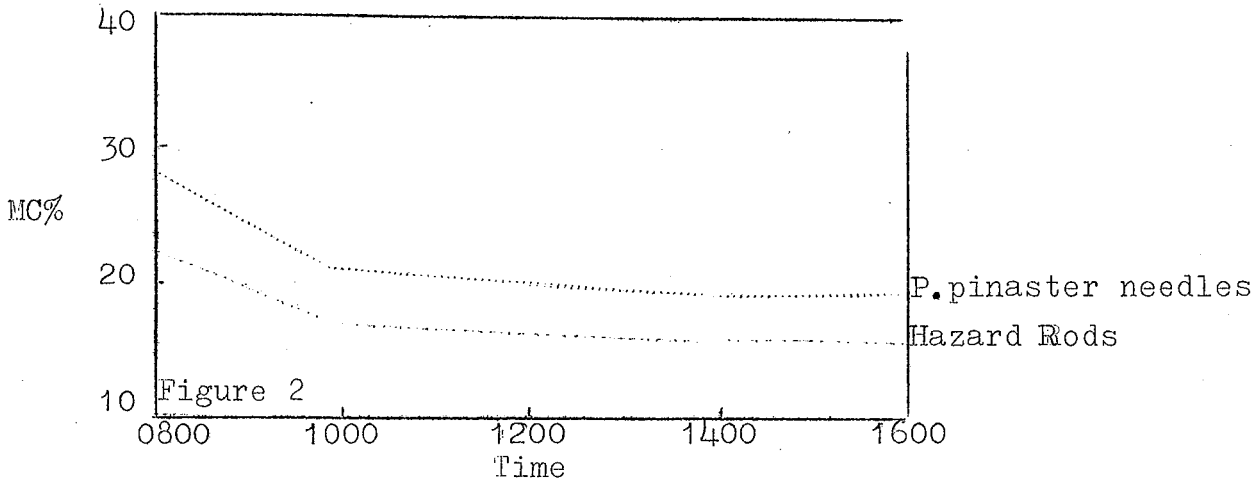


Figure 2

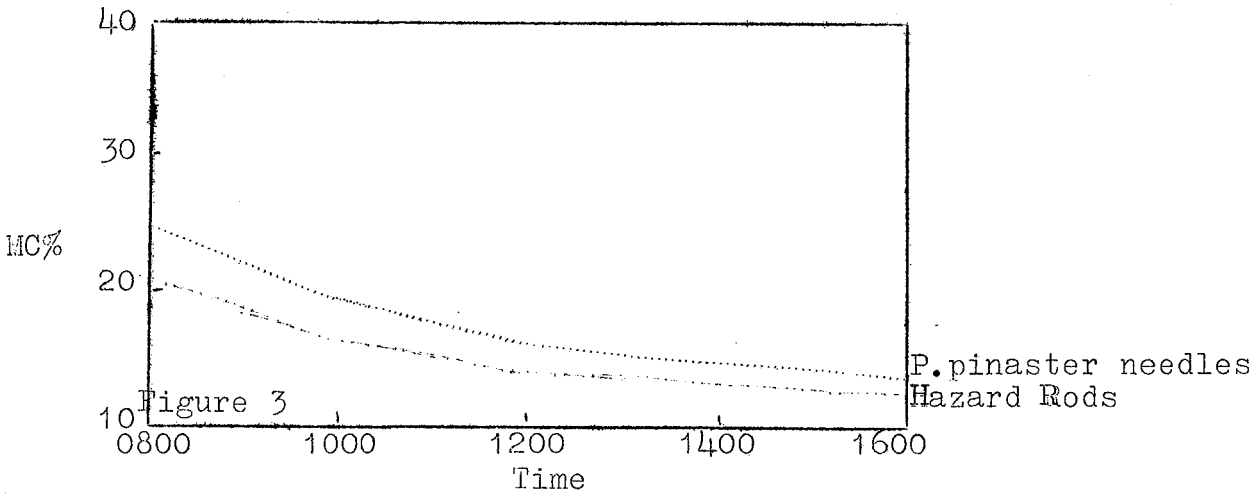


Figure 3

HOW MUCH WOOD DO WE USE?

by P. Barrott

Before we grab a "crystal ball" and start forecasting the future consumption of wood and wood products for any particular country or state, it is necessary to have a few basic facts on which to work. Some of these facts include total sawlog production and the per capita consumption of the various categories of processed wood. Having observed trends in production and consumption over the years it is then time to make projections as to the rate of increase in the population, future trends in consumption etc., and so finish up with an "educated guess" on total timber requirements by say, the year 2,000 A.D.

These noted are intended to provide information for the last five years, by States of the Commonwealth, of -

(1) Total Sawlog Production
(2) Proportion of Sawlogs from Crown Land
(3) Per capita figure for -

(a) Sawnwood Availability which includes the sawn equivalent of plywood and veneer but excludes sawn sleepers.

(b) Plywood Distribution - 3/16" basis.

(c) Hard Fibreboard Distribution - irrespective of thickness.

(d) Particle Board Distribution - irrespective of thickness.

(e) Paper and Paper Products Availability.

(4) Production of Railway Sleepers.

The figures quoted were obtained from the 1964 Forestry and Timber Bureau Report and Timber Supply Reviews.

(1) TOTAL SAWLOG PRODUCTION

The figures in Table 1 are for removals of sawlogs, peeler logs and logs for sawn sleepers from both Crown Land and Private Property.

Table 1 - Total Sawlog Volume
(Millions of Cubic Feet G.T.V.)

State	1960-61	1961-62	1962-63	1963-64*	1964-65*
N.S.W.	76.5	68.6	75.5	81.7	N.A.
Vic.	65.6	62.3	65.2	71.7	"
Qld.	54.3	46.2	50.1	53.0	"
W.A.	48.6	49.0	48.5	49.7	51.0
Tas.	35.2	31.4	34.4	35.5	N.A.
S.A.	21.4	22.4	21.6	22.5	"
A.C.T. + N.T.	1.0	1.0	1.1	1.3	"
Total	302.6	280.9	296.5	315.4	N.A.

* Provisional

It will be noticed in the above table, and in other tables to follow, how the "credit squeeze" reduced production in 1961/62. South Australia and Western Australia were the only States unaffected.

(2) PROPORTION OF SAWLOGS FROM CROWN LAND

Table 2 gives the percentage, by volume, of sawlogs obtained from Crown Land. It will be observed that Victoria and Western Australia rely most on Crown Land timber while Queensland obtains about half its volume from private property. It is also noticeable that the proportion of logs from Crown Land tends to increase in most States.

Table 2 - Percentage Log Removals From Crown Land

State	1960-61	1961-62	1962-63	1963-64ϕ	1964-65ϕ
Vic.	78.8	78.5	79.5	81.2	N.A.
W.A.	77.7	80.0	79.7	79.4	80.8*
S.A.	67.9	65.2	74.9	71.7	N.A.
Tas.	67.3	67.3	70.7	71.1	71.7*
N.S.W.	58.8	61.9	64.1	64.7	N.A.
Qld.	47.1	47.0	46.5	54.6	"
A.C.T. + N.T.	100.0	100.0	100.0	100.0	"
Total	65.8	67.3	68.7	70.4	N.A.

ϕ Provisional *From Annual Report

(3) PER CAPITA "CONSUMPTION"

As the quantity of stocks on hand for some materials, before and after a given period, may not be easily obtained, the word "consumption" is commonly replaced by "availability" or "distribution".

(a) Sawnwood Availability

The per capita figures in Table 3 include sawnwood and the sawn equivalent of plywood and veneer but excludes sawn sleepers.

Table 3 - Sawnwood Availability
(Per capita - super feet)

State	1960-61	1961-62	1962-63	1963-64ϕ	1964-65ϕ
Tas.	284.0	254.9	268.0	248.4	250.6
S.A.	155.0	155.9	144.3	175.2	183.7
Qld.	190.7	153.3	154.4	172.9	171.8
W.A.	163.5	163.4	151.4	164.7	172.4
Vic.	163.5	143.1	146.8	144.3	146.2
N.S.W.	142.4	125.0	128.3	139.6	144.8
* Total	162.7	144.1	145.5	154.4	157.9

*Includes A.C.T. & N.T. ϕ Provisional

It is of interest that the trade is gradually recovering from the set-back occasioned by the "credit squeeze". However, Tasmania, Queensland and Victoria are still well below their 1960-61 figure, but South Australia has improved its trade quite sharply over the past two years. On a per capita basis, Tasmania is still by far the greatest consumer of sawnwood.

(b) Plywood Distribution

Except for the Northern Territory, for which complete figures are not available, Western Australia leads the States in the per capita use of plywood. The industry does not appear to show the same recovery as sawnwood, possibly as a result of the great expansion in the production of particle board (see Table 6).

Table 4 - Plywood Availability
(Per capita - Sq.Ft. 3/16" basis)

State	1960-61	1961-62	1962-63	1963-64ϕ	1964-65ϕ
W.A.	31.9	27.3	29.3	28.3	32.2
S.A.	28.9	25.7	25.7	26.0	29.1
N.S.W.	26.8	24.1	22.6	22.7	21.2
Vic.	20.6	18.6	18.3	17.9	20.4
Qld.	25.4	17.7	15.0	16.4	16.0
Tas.	15.0	10.8	9.1	13.4	13.2
* Total	24.4	22.0	20.4	21.3	21.5

*Includes A.C.T. & N.T. ϕ Provisional

(c) Hard Fibreboard Distribution

The per capita figures are given in square feet, irrespective of thickness.

This industry, which competes with plywood and more recently, particle board, does not appear to be increasing its per capita distribution. A feature of Table 5 is the low usage of this material in Western Australia.

Table 5 - Hardboard Distribution
(Per capita - Sq. Feet)

State	1960-61	1961-62	1962-63	1963-64ϕ	1964-65ϕ
Qld.	32.3	32.8	33.7	37.4	35.8
S.A.	20.0	19.4	22.3	25.3	27.2
Tas.	24.9	24.3	23.9	23.1	24.1
N.S.W.	21.7	22.5	21.6	24.2	24.8
Vic.	22.7	22.8	23.8	24.4	24.0
W.A.	8.6	7.4	7.8	7.6	8.6
* Total	25.6	23.6	24.9	27.2	25.2

* Includes A.C.T. & N.T. ϕ Provisional

(d) Particle Board Distribution

The per capita figures are given in square feet, irrespective of thickness.

Table 6 clearly shows the rapid expansion of the particle board industry over the last five years. The per capita distribution for the Commonwealth has increased more than six-fold and all States share in the expanded use of the material.

Table 6 - Particle Board Distribution
(Per capita - Sq. Feet)

State	1960-61	1961-62	1962-63	1963-64ϕ	1964-65ϕ
S.A.	0.6	1.7	2.5	3.5	5.6
N.S.W.	0.8	1.2	2.0	3.0	4.9
Vic.	0.7	1.2	2.0	2.6	4.6
Qld.	0.5	0.9	1.2	2.0	3.5
W.A.	0.5	0.9	1.4	2.0	3.4
Tas.	0.1	0.3	0.3	1.4	2.4
* Total	0.7	1.2	1.8	3.0	4.5

* Includes A.C.T. & N.T.

ϕ Provisional

(e) Availability of Paper and Paper Products

Per capita figures are given in pounds and refer only to Australia as a whole. To show the increase in usage the figures for 1938-39 are given for comparison.

Table 7 - Paper and Paper Products Availability
(per capita - Lb.)

Category	1938-39	1960-61	1961-62	1962-63	1963-64*
Newsprint	57.5	77.0	58.3	62.8	69.8
Printing & Writing	15.8	31.2	21.0	29.3	28.6
Other Paper	18.1	40.9	41.3	42.7	46.3
Paperboard	21.3	53.3	47.4	55.1	58.2
Total	112.7	202.4	168.0	189.9	202.9

* Provisional

(4) PRODUCTION OF RAILWAY SLEEPERS

Although this item does not come under per capita usage it is thought that the information will be of general interest, particularly as West Australian sleepers are well known throughout many countries of the world.

Hewn sleepers are shown as a percentage under the total for each State. The category "Hewn" is used to refer to sleepers produced within the forest, but it should be noted that most sleepers included in this category are now produced within the forest by portable powered circular saws.

Figures for 1938-39 are shown for comparison.

Table 8 - Production of Railway Sleepers
(Millions of Super Feet)

	1938-39	1960-61	1961-62	1962-63	1963-64*
N.S.W.	30.2	50.3	65.1	48.6	41.6
Hewn %	99	49	50	50	54
W.A.	39.4	39.9	47.2	45.1	43.6
Hewn %	48	Nil	Nil	Nil	Nil
Qld.	17.6	28.2	22.2	27.4	38.2
Hewn %	51	2	2	3	3
Vic.	9.1	29.9	23.2	21.8	25.7
Hewn %	81	79	86	76	73
Tas.	3.0	3.8	3.8	3.4	3.6
Hewn %	100	73	79	83	85
S.A.	6.6	1.2	1.9	1.9	1.8
Hewn %	70	Nil	Nil	Nil	Nil
Total	105.9	153.3	163.4	148.3	154.6
Hewn %	69	34	36	30	29

* Provisional

"Hewn" sleepers continue to represent about half of the sleeper production for New South Wales, while the figure for both Victoria and Tasmania would be about 80%. Western Australia and South Australia have long since ceased the production of "hewn" sleepers and only very small quantities are supplied in Queensland.

In view of the very high demand over the past 18 months for sleepers for the broad-guage link to Kalgoorlie and the complex of iron ore railroads in the North-West, the last figures for production in W.A. are of interest.

1964-65 = 50.4 million su.ft.
1965 = 60.1 " " (Calendar year)
Source : Cwlth Statistician - Monthly Returns.

It is hoped that the foregoing set of tables will serve as a useful reference to those interested in wood use in Australia and particularly Western Australia.

P. RADIATA SITE GRADING.

A.L. Clifton.

The question may well be asked.

How does one arrive at the suitability of a site for Pinus radiata?

It is well known that P. radiata makes big demands on the nutrient reserves of a soil. Intensive plantings of any species require a lot of moisture; and trees the way we want them to grow require good anchorage. A certain amount of protection from exposure to the elements of weather is essential too.

It will be readily seen that parent materials lacking in nutrients can not develop into a fertile soil, and aging of a good soil will lead to a loss of fertility due to leaching and lateritisation. Excessive drainage or lack of it will limit the available moisture reserves, and so will exposure to sun and wind. Anchorage will be limited by conditions which restrict the deep ramifying of roots, such as sheet rock, impermeable clay, permanently waterlogged layers and so on.

With experience, one can examine a site, especially the soil profile and read from its characteristics what condition it is in.

External evidences give a preliminary guide. Thus slope and aspect give an indication of the exposure of the site; while condition and type of vegetation indicate moisture and fertility. Land form gives a clue to underground water, too.

Within the soil, the depth and colour of the A_1 horizon is a useful guide to fertility. Colour and texture of the A_2 horizon is a guide to drainage, and moisture storage conditions, age of the soil and to its nutrient status in the case of basic soils. The A_2 horizon depth is a guide to anchorage. B horizon conditions also point to nutrient reserves (colour), moisture relations (type of mottling and structure), anchorage (friability or pentrability). Age is expressed in the contrast between texture of the A_2 and B_1 horizons, and the presence of immature ironstone gravels in the mottles indicates degree of lateritisation. Hardened, rounded gravels, and certain structure features in this zone indicate that the soil is forming on material dumped there as erosion products from higher up slope. Parent rock, too, is a valuable guide to the nutrient potential of the site, and so on.

All these points should be integrated by the field officer. Most people readily gain an impression of a "good" soil or a "poor" soil, without being conscious of the factors which contribute to the final judgement.

A more scientific approach is to consider the site under the four headings:

Nutrient, Moisture, Anchorage, Protection.

Field characteristics which point to sites' status in these basic requirements are then considered.

Points can then be given to each characteristic according to its significance for P.radiata. Assign each requirement a maximum number of points so that the total maximum is 100. Table No. 1 sets out these headings.

Table No. 1.

Basic Requirement & Maximum Points.	Indicative Characteristics	Maximum Points.
Apparent Nutrient Status (30)	(a). A_1 horizon thickness, colour, texture.	(6)
	(b). Parent Rock type	(6)
	(c). Ageing effects (podsolisation) (lateritisation)	(6)
	(d). Colour sequence down profile	(6)
	(e). Native vegetation(Health)	(6)
Moisture Availability (40)	(a). Effective storage capacity (texture) (+ consistence) (+ structure) (+ pore space)	(10)
	(b). Moisture from sources (seepage) or other than precipitation (impounded)	(10)
	(c). Native vegetation (lushness) of growth)	(10)
	(d). Effective depth (penetrability of subsoil).	(10)
Anchorage (20)	(a). Effective root (penetrability of growing space (subsoil).	(10)
	(b). Drainage (colour patterns). (subsoil structure)	(10)
Protection (10)	* Exposure (slope) (aspect) (shape of surface)	(10)

* Meteorological conditions and insolation only necessary when there is variation within a region.

Tally the scores and treat as a test in school with grades as in Table No. 2.

Table No. 2.

Point Score Range for Each Grading.

Excellent	A	=	86 - 100.
Good	B	=	71 - 85.
Satisfactory	C	=	56 - 70.
Marginal	D	=	41 - 55.
Submarginal	E	=	26 - 40.
Unsuitable	F	=	below 26.

Anticipated yields are shown on Table No. 3.

Anticipated Yields Within Each Grade.

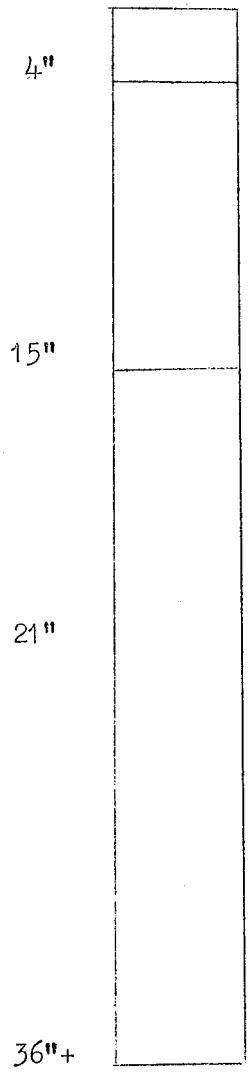
Table No. 3.

Grade.	Est. S.Q. (S.A. System).	Yield M.A.I. Age 30.	Height Growth* M.A.I. Age 30.
A	I - II	520c'/ac/yr.	4.5ft/yr.
B	III	430 "	4.0 "
C	IV - V+	350 "	3.3 "
D	Low V. & poorer.	Unpredictable.	Unpredictable.

* Growth rate varies with age.

Let us examine a typical pine soil in the Blackwood Valley, using the normal field description procedures.

Profile



Strong brown sandy loam.

Red brown sandy clay loam friable.

Dark red clay, cloddy, becoming massive.

Dark yellow clay, tough, intractible weakly structured.

Topography :- upper slope near crest of ridge. western aspect. Slope; one in three.

Vegetation :- jarrah - marri regrowth (healthy.) bracken.

Probable fertility :- high.

Moisture relations :- poor, due to shallowness to dense clay.

Genesis :- parent rock is basic gneiss.

Classification :- Suitability - fair, C grade.
Soil type - basic.

Location :- F x 56: 4.9.

This standard description* covers all the information we need to allocate points.

Apparent nutrient Status	(a).	6 (rich appearance).
	(b).	6 (basic).
	(c).	6 (No ageing in evidence).
	(d).	6 (Strong colours).
	(e).	5 (healthy vegetation).

S/Total 29/30.

Moisture Availability	(a).	8 (good consistency to 20"+).
	(b).	0 (no other reserves apparent).
	(c).	7 (healthy).
	(d).	5 (only 20" free penetration).

S/Total 23/40.

Anchorage.	(a).	5 (restricted growing space).
	(b).	6 (transverse drainage due to slope not much in subsoil).

S/Total 11/20.

Protection.	(a).	3/10 (exposed site).

66/100.

This tally confirms the field estimate of "C" grade. With high fertility, pines will probably grow fast initially until stiff competition for moisture slows the stand down. Growth rate over 30 years should be equivalent to top S.Q. IV.

Many of the ideas in the above have been expressed previously by the following authors (and others)-

Coile, T.S. 1952 "Soils and the Growth of Forests." Advances in Agronomy. Vol. IV.

Hamilton, C.D. 1962 "Soils and Forest Site Classification" 3rd Aust. Conference of Soil Science. P No. 24.

* Slightly modified for simplicity in presentation. Abbreviations minimised.

A NOTE ON SCRUB BURNING.

by J. McCormick

In controlled burning the Jarrah forest there are many factors which have to be taken into consideration as you are well aware. However, there is one particular and I think important factor of which the author knows little or nothing and that is the diurnal and seasonal fluctuation of scrub moisture content. When I mention scrub, I mean of course the major scrub species Acacia pulchella, Acacia drummondii, Bossiaea aquilifolium, Acacia strigosa etc. which occur throughout the forest in dense masses 3' to 6' in height; particularly in areas which have been subjected to previous wildfires. It is obvious that these dense scrub masses will have to go and that they will have to be removed by controlled burning.

I feel somehow that these scrub masses can be burned off satisfactorily i.e. without undue scorching and that maximum burning conditions are neither necessary or desirable. I am prompted to make this statement by recent observations in the field where a number of experimental fires have been run in dense scrub as described above.

The conditions obtained during these fires were - Temperature 70° - 75°, Relative Humidity 50 - 55%, Wind Speed 2 - 3 m.p.h. at 4'6" within the stand and a Fuel Quantity range of 2 - 3 T.P.A. whose Profile Moisture Content was 31.2%.

Nothing particularly alarming in these conditions, in fact they were approaching the ideal for the job in hand.

Results - A good clean burn in which the scrub was all but totally killed and in which scorch heights recorded were from 10 - 20 feet. A number of damaged veterans caught alight and burned for some hours and as a result of this they received complete crown scorching. Other veterans in the stand showed bark charring to a height of approximately 15 feet. In places where groups of small saplings occurred and whose height ranged from 6 - 15 feet, the individual saplings within these groups received about 50% crown scorch only and I contribute this to the fact that the scrub grew less densely beneath these groups. Taller saplings and poles showed little or no crown scorch. It is obvious that young regeneration will suffer mostly in these scrub burns, however, this I feel sure will be more than compensated by the clearing effect these burns will bring in making room for future regeneration and by eliminating competition.

Now the point I am coming to is that these experimental fires were lit <u>after</u> 11 a.m.; previous to this hour the bush would not support a scrub burn. On making a few enquiries concerning a number of excellent scrub burns around the Dwellingup division I found that these burns were put in <u>after</u> midday and this is the point I wish to focus on and which drew my attention to the somewhat neglected factor i.e. scrub moisture content. As a result, a small moisture trial was put in on A. strigosa by way of a feeler and showed some interesting results.

A. strigosa was sampled for moisture content at two hourly intervals from 0800 to 1600 on the days 1st Oct., 6th Jan. and 12th Jan. 1965 - 66 and results are illustrated by the three curves. Figs. 1,2 & 3. On looking at these curves the first and most noticeable factor is the drop in M.C.% which occurs befors midday;

also the period of least moisture content is progressed as the season progreses; furthermore the M.C.% pickup also progresses with seasonal progresses.

From such met. data as could be obtained during this trial the R.H. values (not included in this note) showed an interesting parallel to the scrub moisture changes and this was probably due to the effect atmospheric moisture (combined with other factors) has on stomatal closure.

My own opinion at the moment concerning scrub burning is - light up at midday (late Spring and Autumn when conditions are favourable) and as the season progresses the lighting up time will extend i,e. the actual burning time in hours per day. If scrub burns well early in the morning it will probably cook up in the afternoon; if it doesn't burn early in the morning then why bother? A patchy burn will be the result. In the meantime the burning gangs might well be better employed elsewhere.

To extend the scrub moisture experiment a number of major scrub types would have to be sampled throughout the day from about sunrise to sunset and at fortnightly intervals throughout the Spring/Autumn burning season. Met. data would be recorded at each sampling time. In future experimental scrub fires, scrub moisture samples will be taken and compared with burning results.

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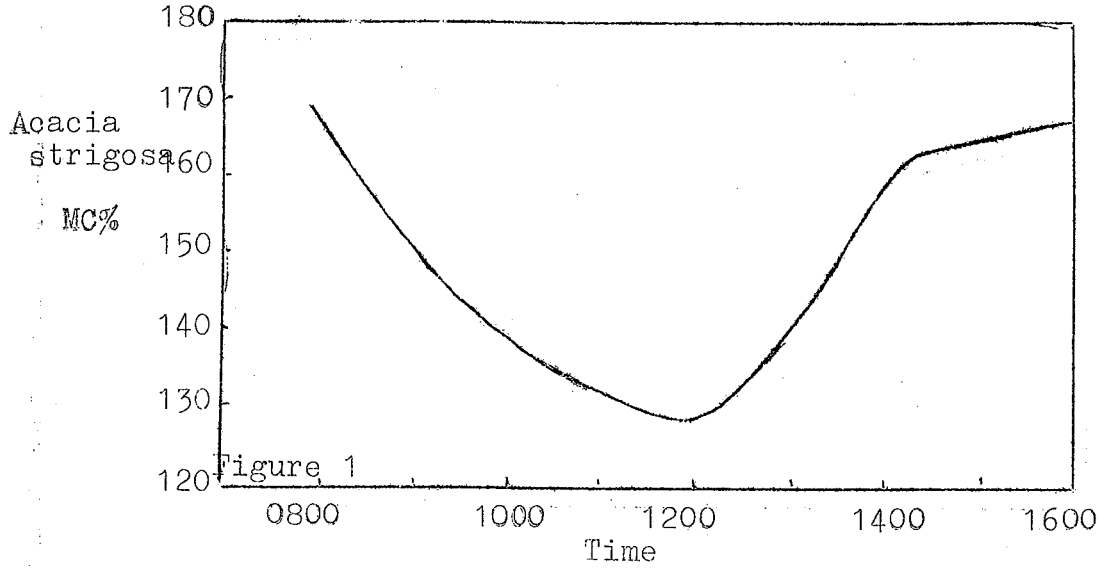

Figure 1

October 1,1965

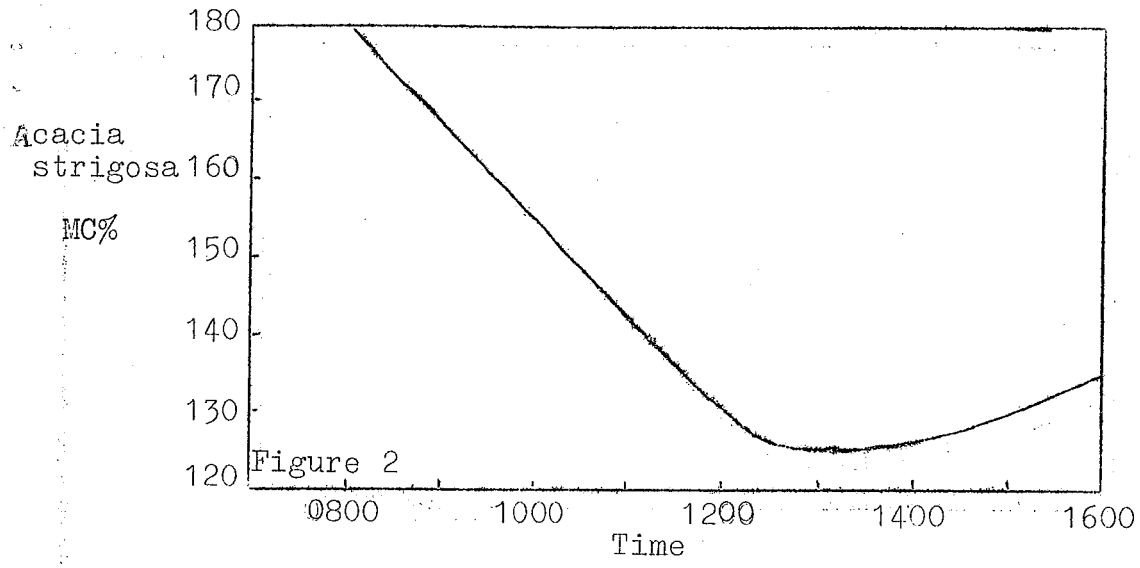

Figure 2

Jan 6, 1966

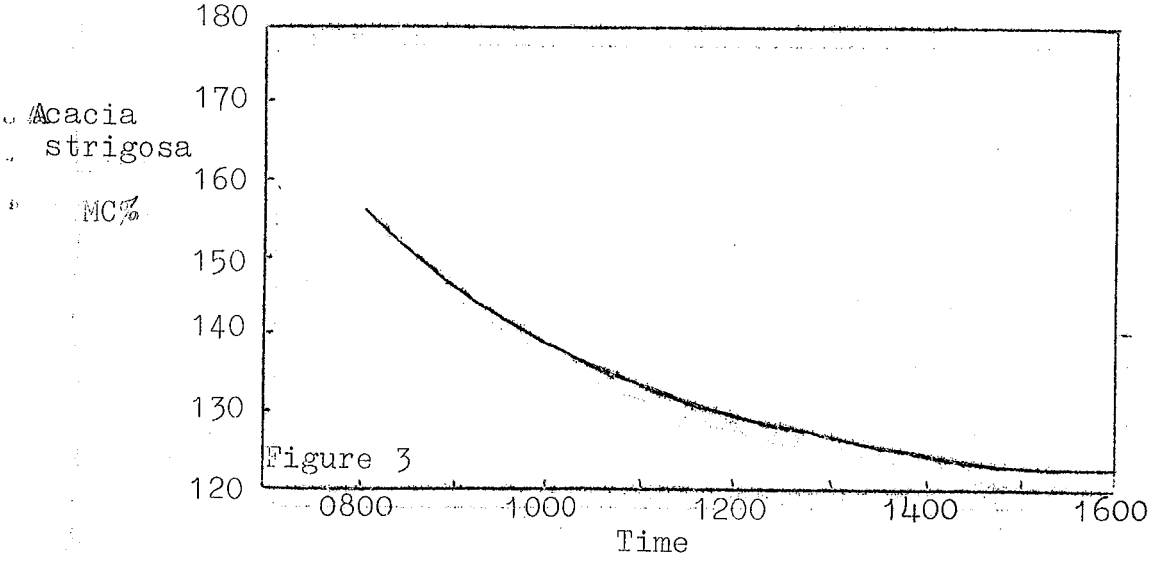

Figure 3

Jan 12, 1966