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FOREST NOTES

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Editor : R. J. Underwood.

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EDITORIAL

Observant readers will have noticed a change in the type-print used in this and in the last issue of Forest Notes. After nearly ten years of producing our journal by means of local and head office typists typing straight onto roneo stencils, the job is now being handled by the Government Printing Office, using an offset printer.

With this change, it is appropriate now to express gratitude for the work done by Departmental librarian Janet Bull and her assistants in the typing and collating of past issues of Forest Notes. The standard of their work was very high, and a credit to them. Thanks are also due to Drafting Branch for their ready assistance in the preparation of graphs and diagrams. The standard of their work and their co-operation has also been excellent.

Comments from readers indicate that the Regional Notes section introduced in the last issue was generally well accepted, and this section will continue for as long as the supply of regional information continues.

The next issue of Forest Notes will probably appear in April, 1969: deadline for contributors will be March 12th, 1969. Contributors are again reminded to submit their articles, typed and on quarto paper.

NEW CADET TRAINING SCHEME.

By Ross Gobby.

Every Forester is familiar with the rapid changes that have taken place in recent years within the profession. To do the job, most of us need more technical skills and background knowledge than were necessary several years ago. It is only in the last few years that die-back control, aerial burning, tree breeding and the use of controlled burning tables along with other advances have increased the demand for well trained foresters. To help satisfy this demand in future years a new training programme for field officers is being developed.

The new West Australian Forestry School Course will consist of nine months theoretical training at the Mount Lawley Technical School and fifteen months field training at the Dwellingup and Manjimup training centres. While at the Mount Lawley Technical school, forestry cadets will cover Forest maths, English, botany, soils, pathology, entomology, climatology, horticulture, statistics, surveying chemistry, physics and geology. One half day per week will be devoted to motor and machine maintenance, telephone and radio communications. The course will be conducted by Technical education teachers, but the syllabus and notes for the course will be prepared in close co-operation with the department. One day per week during this period the cadets will do practical exercises under the guidance of a forester in plantations and in natural forest near Perth. Surveying, soil surveying, nursery work, pine burning and field trips associated with theoretical lectures will be done on this day.

The fifteen months field training section of the course will run on similar lines to the existing course but training will be intensified because the bulk of the theoretical work will have been covered. At present it is likely that three months will be spent at the West Manjimup training centre (the old tobacco research station, recently purchased by the Forests Department).

The balance of the field training will be done at Dwellingup apart from a ten week period during winter when cadets will be stationed at different pine plantations.

Because the level of the course given at the Mount Lawley Technical School will be leaving certificate standard or just below, potential cadets will be expected to have completed fifth year high school or at least have a very good junior. After selection cadets will be required to do at least six weeks work in divisions with gangs and field staff officers. Our idea here is to give potential cadets a chance to see what a foresters job is like so

that they can decide whether this is the career for them. This preliminary period will be followed by a three week induction course at the Manjimup Training Centre, before cadets go to the Mount Lawley Technical School.

A certificate will be presented to cadets who have successfully completed the course. Because of the higher standard of the course it is hoped that this certificate will be recognised by other state forest services. Newly appointed forest guards will still be considered to be in training for two years. During this time monthly reports on the major item of work for the month will be required for the first twelve months to give practice in report writing.

In the next twelve months a longer dissertation or thesis will be required showing that thought has been given to some forestry subject which has been explored in depth.

Although the new course at The West Australian Forestry School will allocate less time to practical field training it is felt that the benefits of having specialist teachers give the theoretical section of the course will improve the overall standard of training. Since the training scheme is designed to produce men who can do the job in the field as well as technical officers for the research section, comments are invited on how this measures up to that aim. The content of the course is constantly under review and suggestion for improvements are welcomed.

TOWARDS BETTER FIELD ACCOUNTING

1. *Job Numbering - Not New But. . . .

By W. F. Townsend.

The new format of Divisional Works Programme/Estimates/Reports has lent itself to the institution of a job numbering system which is free, in the main, from the dangers of individual ideas and interpretations of accounts. Most of the elasticity in works programmes is disappearing by virtue of better control and a major aim of Field Accounting should be to increase the accuracy of these programmes.

At Pemberton, a job numbering system was implemented from the beginning of the current financial year, and has worked admirably.

Each job on the Estimates works programme was allocated a job number, so that in effect the Fund and Item number became enlarged. A list was prepared covering all funds, items, and jobs and a copy of this list given to all officers in charge of gang units. If jobs not originally planned become operative, a job number covering the operation is added to the list. Unit costing of all operations thus occurs through normal expenditure recording channels.

The job number is given to the Overseer or Plant Operator each morning after perusal of

1. Works Programme
2. Job Numbering list.

The Overseer enters this number on both the daily Diary Sheet and the vehicle or plant running book sheet each day.

The mode of numbering in the current year is somewhat crude, due to hasty preparation and initial lack of experience, but this detracts little from its practical use.

Fund 1 jobs were simply given a numerical suffix to the item numbers, but it was considered desirable, because of the complexities of the Division's roading and other programmes, to use a lettering system on other funds. Item 2/12A3 for instance, called for over 40 numbers and it is not hard to envisage a wrong digit being used somewhere along the line and upsetting things. Letters, on the other hand, can in most cases be used as initials, so that job numbers can mean something to Overseers and others. (For instance S = Selection, P = Pipes, G = Gravel, D = Dept, H = Hire).

An extra column is used on item cost cards for insertion of the job number, or alternatively, a separate card is used for each job, depending on the number of entries envisaged under each item. By taking care in policing Overseer's entries, and in preparation of form 167 and plant cost summary, cost card entries of wages and plant can be readily handled by female assistants. Materials costs are entered in pencil for unit costing

purposes to avoid delay, and actual material costs entered in ink from suspense accounts when to hand. In this way, preparation of the Bi-Annual Report is simply a matter of transferring from cards to the new type estimate sheets.

*This article is the first in a series on Forest Accounting. The Author is Forest Assistant, Pemberton Division.

An idea of how the Pemberton list was compiled might be gained from the following.

Consider Fund 2 Item 12. Six roads are listed for upgrading. Each in a different forest type and/or through different topographical features, means a total cost per mile of varying proportions. Item costs for each component in the construction of each road are therefore required.

1. Each road is given a number (1 - 6)
2. Unit costing is required for
   (a) Selection (S)
   (b) Clearing and rough forming by dozer (D)
   (c) Felling and blasting clearing (C)
   (d) Installation of Pipes (P)
   (e) From Grading (F)
   (f) Gravelling (G)
3. Some roads are to be done by Contract and some by Department Plant.
   Hired Plant (H)
   Dept. Plant (D)

The numbering list, under 2/12A3 would include inter alia

H1S Selection "Jones Rd" (1st of Contract Rds)
H2S " "Smith Rd" (2nd of " ")
etc

D5S Selection "Brown Rd" (1st of Dept. Rds)
D6S " "Gray Rd" (2nd of " ")
H1D Clearing by Dozer "Jones Rd."
etc to

D6D Clearing by Dozer to "Gray Rd"
H1C Felling & Blasting "Jones Rd"
to

D6C Felling & Blasting "Gray Rd"
H1P to D6P for pipes and so on.

Under 2/12A2, included would be

H1G Gravelling	"Jones Rd"
to	
D6G "	"Gray Rd"

What must be considered of course, is what unit costing is required and a decision on this must be made before the 1st pay period of the financial year.

It is hoped that as time goes by, the system of numbering will be streamlined, and any ideas, either already in practice or otherwise, would be welcome. What is really required is a uniform system which can be applied to each or any Division, irrespective of where the emphasis on jobs may lie. Inspectors may well relish the thought that costs may be "compared" between Divisions rather than "contrasted", just as uniformity is being emphasized in the Works Programmes themselves.

"THE GOSPEL OF MANJ"

Now it came to pass that the Head Serang, who is Grace of the Donald tribe,called his mighty warriors together and spake unto them, saying: "Verily, the time has come to wrest from the Shannonites the trophy of the mighty House of Beggs."

And so the word went forth, even unto the land of the Toneites and the peoples of the Frostus Nelso tribes. "Our leader has spoken with wisdom and his words are not to be taken as of dust from the oxen".

And so, on the third Sabbath of the second month, the mighty warriors of Manj journeyed deep into the great forest which shields the bald pates of those who venture in the noonday sun, seeking the battleground of the Shannonites.

Then the Head of the Shannon tribes, yea, even of the great House of Mustard, who had word of this great coming said unto his multitude: "Gird up your loins and let us send these warriors of great repute away without vanquishing us".

And it was so.

And Stephen, from the land of the Wanneroos, wise in the ways of the willow and the toss, yea, even unto the double header, spake and said unto Donald, the son of Keene: "Sheath thy sword and take up the willow".

And the men of the Shannonites smote with much might until, as the sun reached the zenith, the two wise men from the House of Nicola and from the House of Skeeto, called unto the warriors to cease.

And the scribe read from his parchment a score of ninety for the loss of two warriors.

Then they were athirst and drank deeply of the waters of the mighty Swan mixed with the fermented grain and the hops.

And lo, as the battle raged, the Shannonites, yea, even he from the Gareen and he from the tribe of Broadmen, smote with further might and the warriors of Manj were like unto the bee or the crow which is smitten with rheumatism.

Now the scribe unfolded his parchment and read of one hundred and fifty ere the Shannonites were vanquished.

And so the warriors of Manj took up the willow and verily some there were who handled the willow like unto a gin with a nulla nulla.

And as the scribe consulted his parchment there were written but one hundred and five.

Then the fair ladies of Shannon prepared a feast and with one accord the warriors devoured the viands and drank sparingly of the waters of the Shannon mixed with lactic juices and stained with the leaves of the ti tree.

And then a great silence fell upon the host as the Head Serang named Grace said unto them: "Verily, these are moments of sadness as I return unto you this trophy from the mighty House of Beggs." And he had praise for the ladies of Shannon and for the two wise men.

Then they were again athirst and drank deeply from the keg of the Swan, those of the Shannonites saying unto themselves, "Verily, we are mighty men." And the warriors of Manj spake unto one another, "Verily, we are mug bloody cricketers."

And as the shadows deepened over the ground of battle the men of Manj departed from the forest each to his own tribe and saying unto them, "Our luck was as a blood orange which is over ripe."

Yet they believed them not for hath not the prophet said, "All men are liars."

So be it.

The Scribe.

RANDOM THOUGHTS ON PINE BURNING

By J. McCormick.

The pine burning season is now over and there are some amongst us who can put worry aside until it is on again. Certainly the forest officer who has pine burning on his plate is not a man to be envied; his one consolation is that having completed a pine burning programme he has carried out the most important safety act of all.

With pine planting on the increase and the resultant increase in plantation size, the argument for and against controlled burning in pine seems to fade into the dim distant past, whilst the fire risk becomes greater with increased population stress both in Metropolitan and country areas.

The major concern of those employed in controlled pine-burning operations is that of crown scorch; it does in fact present a constant worry, in the absence of which, the word 'controlled' may well drop out of the term altogether. To the question "What is the detrimental effect of crown scorching on pine tree growth", we do not as yet have an answer. However, if we look at such local information as we have to hand we may be a little bit the wiser. The most common type of scorching that occurs is that in which the needles on the lower limbs only are affected and less commonly, that in which the branch cambium is killed thus leaving a number of dead branches on the lower crown, the result of which would be a pruning effect. (See R. J. Underwood's "A study of the Effect of Pruning...") The latter and more severe type of scorch is brought about in a controlled burn mainly where slash heaps are concerned and where there is an accumulation of dry pruning slash pulled in around compartment edges which, whilst burning, release intense heat for prolonged periods.

During burning operation in Somerville Plantation in September, 1966, fifty foot high P. pinaster in a small exposed area received severe scorching Six months after the event a dendrometer trial was put in to isolate the effect of scorching at different levels of intensity on G. B. H. growth. The trial was of necessity a small one in which ten trees in each of the three scorch categories were examined. The average green crown height of the thirty trees considered before scorching was 24 ft. (approx.) and the green crown heights (six months after scorching were one foot, six inches (A), seven feet, six inches (B) and ten feet, six inches (C). Each of the 30 trees was matched with a burned but unscorched tree to a girth accuracy of a quarter of an inch. Measured at monthly intervals for one year the growth results are compared (see graphs).

The total growth was :-

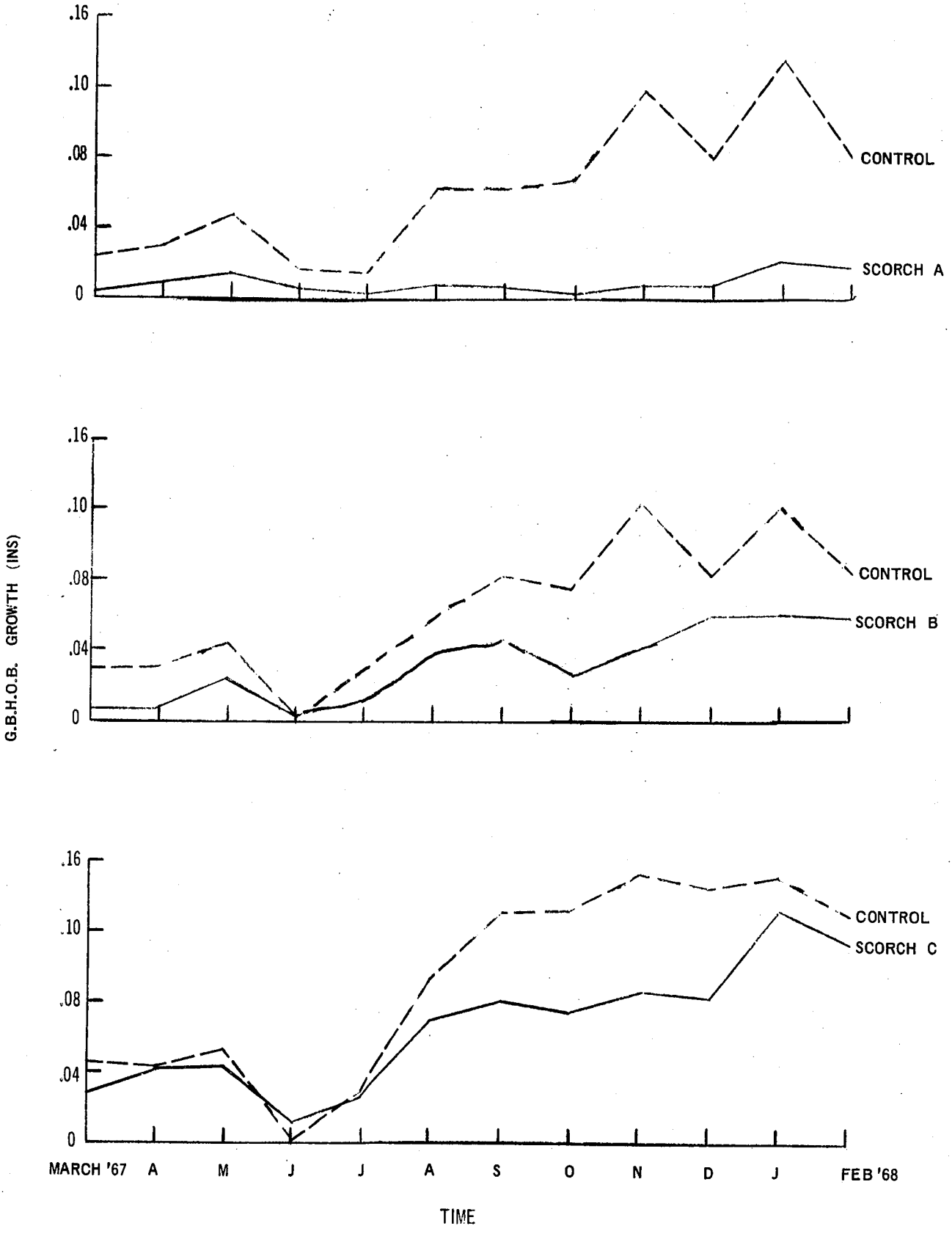
GIRTH INCREMENT.

	Scorch	Control	Diff.	Sig.	Mean G.B.H.O.B.
CLASS A	.125"	.701"	.576"	.01	26.90"
CLASS B	.383"	.735"	.352"	.05	27.05"
CLASS C	.750"	1.004"	.254"	N.S.	29.07"

At the time of writing i.e. two years after the scorching took place, the growth discrepancy in Class C has virtually disappeared whilst that in Class A remains. A considerable amount of green crown has been replaced on all trees but there is still a marked difference in green crown height between the A and C class trees. In the former class the pruning effect has been carried much higher into the tree crowns.

If the effect of light needle scorch on P. pinaster girth growth bore some relation to that indicated by severe scorch then this effect would be slight to negligible; yet to adopt this assumption would be most unwise since there is as yet no evidence one way or the other. It does appear that the motto of the controlled-burner in pine plantations will ever be, "Watch and Worry."

P. PINASTER GROWTH (12 MONTHS)



THE SHAPE OF THINGS TO COME

By T. J. Welch

As it is quite apparent that the logging industry is undergoing considerable changes in extraction methods, particularly in the sphere of modern mechanisation, it will be a matter of great interest and pride to all in this Department, to know that we are not only joining this tempo, but that we are about to witness several "firsts" in forest operations in this State, and in addition a "first" in Australia, in the full scale commercial application of one method.

Reference to the latter is to advise that an order has been placed for delivery in late January of a Massey-Ferguson "Treever" model 2200, "Forwarder".

The terminology of the logging industry classes a machine as a "Forwarder" where it is designed to pick up the load at the stump using a mounted crane, and carry the load out to the major road or loading platform, thus obviating the necessity for highway trucks to leave the main developed roads. This type of machine is an advanced development over the "Skidder" which is designed primarily for snigging full length logs.

The "Treever" with the "Hiab" type "luffing" crane, hydraulic rotator and log grapple is capable of also transferring the load from its own deck to the road transport, or from ground to transport. It requires only the operator to carry out all functions, which include collecting the stray logs which may roll from the stack, and turning misshapen logs end for end to provide more orderly and compact loading.

The "Treever" is a four wheel drive rubber tyred unit, with mid-l position articulated steering, a "Hiab" type crane mounted immediately behind the driver, and a log deck with "stake" sides, over the rear axle, and which has a capacity of approx. two tons of 8 feet length logs.

The machine is built by Gafner Automotive and Machine Corp., of Escanaba, Michigan, U.S.A., using the MF 203 Industrial Tractor (minus front axle) for the front unit, and the MF 203 rear axle for the rear half thus completing the four wheel drive.

The drive to the rear axle, which must be of unity ratio (1:1) is achieved where the makers have discarded the original tractor differential and transmission housing, replacing same with a steel fabricated housing which accommodates the extra rear drive bevel pinion.

A small hydraulic operated dozer blade is fitted to the front, which is available for self help duties such as clearing slash or debris, levelling soft earth mounds in the path, rolling of logs, and finally to stabilise the machine, during crane operation. The amazing feature is that of the fantastic performance obtained with only the power of the 3 cylinder diesel engine of the M. F. 135 Tractor, which develops 44 Brake Horse Power.

Basic Specifications are as follows :-

Brake Horse Power - 43.5 at 2250 R. P. M.
No. of Forward Gears - 6.
Speed Range at Max. Engine R. P. M. - 1.23 to 16 M. P. H.
Tyre Size - 16.9" x 26" (Equal on four wheels).
Ground Clearance - 17 inches.
Wheelbase - 119 inches.
Overall Width - 88 inches (over tyres).
Overall Length - 13 feet 6 inches.
Tare Weight - 4 tons 10 cwts.
Crane Lifting Capacity - 1500 lbs.
Cost is $15,500.

The "Treever" was observed operating at Oberon N. S. W. in June 1968, on the extraction of P. radiata thinnings, average 6" diameter, 8 feet length.

One example was from standing in the outrow at one pyramid stack (no stakes), the operator loaded this stack which constituted approx. half the load, then moved the machine along approx. $1\frac{1}{2}$ chains, and loaded a similar volume to complete the full load. No assistance was provided on the ground; the operator did, however, leave the control platform to reposition two logs which rolled away, but this would not have been necessary as the function of the rotator and grapple would have easily secured them in one extra lift. In all, the time taken was nine minutes, and this was achieved by an operator who had less than three weeks experience.

Another observation was made of the "Treever" with full load and all-up weight of $6\frac{1}{2}$ tons, assisting by towing a 7 ton table top truck carrying approx. 5 loads of the same logs, from where the truck had slipped into the road boxing and was spinning the drive wheels. The "Treever" provided sufficient additional power to haul the truck up a gradient of 1 in 8, on a sticky clay surfaced access road in the plantation, which had been, and was at that time under light snow fall and the resultant thaw.

On the basis of some early figures obtained it appears that the following output can be expected.

Working on a lead of 4 chains from roadside loading site to stump the unit can travel out, pick up 1.6 loads pre-stacked on the outrow, in a cycle of 12 minutes. This means a rate of 8 loads per hour.

Time taken to load 7 ton table top truck with 5 loads is approx. half an hour.

It is now believed that the machine is capable of hauling and loading 40 loads per day, i.e.

a) Load and carry from plantation to road @ 8 loads per hour = 5 hours.

b) Load onto trucks @ 5 loads per $\frac{1}{2}$ hour = 4 hours.

(Output based on a 9 hour working day.)

Of the other "firsts" mentioned, we are already acquainted with the introduction of the "Timberjack" "Skidder" into plantation logging.

Next to come will be the "Hiab" crane mounted on the rear of a Chamberlain Champion MK 11 Industrial Tractor, to be used for roadside loading onto the transports.

Purchase of one unit is already proceeding and to follow this will be the Massey-Ferguson MF 203 Industrial Tractor, fitted with Half-Tracks, and the rear mounted logging winch and skid pan.

The M.F. 203 with half-tracks and winch is designed as a comparative low capital cost unit (approx. $5,165) for use in sparse operations or low volume thinnings.

The beginning of this new concept of modern logging will no doubt usher in many changes in the areas of planning, felling and extraction methods, haulage contracts, and labour, and so should provide the Forester with many new and interesting challenges.

A LOOK AT PINUS CANARIENSIS IN THE MUNDARING DISTRICT

By A. B. Selkirk.

Introduction

It has been my privilege to have been associated with pine establishment in the Mundaring Division long enough in some cases to observe the maturity of some species from nursery stock. Some of the characteristics of Pinus canariensis have long appeared to me to have a special significance and I have thought it worthwhile to share these observations with others and put together a few facts for the records.

Involved technical data has been purposely avoided as I felt the species alone can impress without dressing up in frills of annual increments and other growth data.

The Species at Mundaring

The first planting of Pinus canariensis was done in Greystones Block at Mundaring Weir in 1926. The source of the seed was Teneriffe Canary Islands and seedlings were raised in trays made from old four gallon petrol tins cut length ways down the middle. These trays of 1-0 stock were carried into the field and planting was done by mattocking out a small pit in roughly cleared unploughed land. The young plants were taken from the trays with the least disturbance as possible and tamped in by hand hoe. Fifty per cent deaths occurred in the first year and the area was refilled in 1927. By 1928 the planting was reported as being 8" to 4' and 5' in height with few failures even on rocky ground. The area is typical radiata type soil deriving from the decomposition of a diorite knoll blending into a granitic silt in places. 1939 records give the area a description of trees at 12' - 18' height and of excellent quality.

Towards the end of 1949 the section was hit by a fierce uncontrolled fire and a third of the stand was completely blackened and defoliated along with approximately 25 acres of radiata. Before salvage cutting was completed it was noted that the canariensis was not dying but was in fact bursting forth in masses of epicormic shoots. Some of these trees were exposed to the full heat of the fire on a rocky knoll where their boles were interlaced with old, dry Eucalyptus crowns; these old limbs burnt patches into the cambium layer of some trees and left dry areas which are visible today as partly overgrown scars and dry sides at the base. Except for these and some patches of blackened bark there is little difference in the general appearance of this section and the rest of the stand today.

The form over the 8 acres is magnificent with a codominal height of 90 feet. Three thinnings have been done over the area and approximately 100 trees per acre remain today having a volume of 46 loads per acre, 40 loads having been removed to date.

The adjacent area of radiata destroyed by fire and replanted in 1950 also covered a small number of canariensis stumps left from the salvage cut. The coppiced stems on these stumps were thinned when 8 ft high during a cleaning operation of the planted radiata. These stems are now competing with the radiata and have completely overgrown the old stump at ground level. Some have a diameter O.B.B.H. of 8 inches at 18 years. On some of the elevated granite shelves and floater strewn slopes the radiata has shown considerable mortality and has been salvaged, but in no single case has a canariensis specimen shown any signs of deterioration from drought.

Some amount of self regeneration from seed is also visible on the open patches amongst broken granite rocks.

In 1928 a small number of P. canariensis were planted in Greystones Compartment 6 in company with radiata and pinaster. The soil type is a rather poor granitic silt with lateritic intrusions. Native forest types were Wandoo, Marri and poor form Black Butt.

By 1958 the radiata was clear felled, yielding approximately 50 loads per acre. At this stage increment had ceased with the majority of trees having a dead leader and short, yellow needles. In the following year the pinaster was clear felled because of poor form, and isolation requiring expensive fire protection. Six trees of canariensis were retained on the site as no fire protection was necessary for them, and owing to their value for future observations. This small group remains today in full vigour at 80 feet.

The 1929 planting in the Beraking Block included P. canariensis amongst other species such as P. coulteri, P. halapensis, P. laricio and P. ponderosa. Canariensis has outstripped all these and has equalled the volume of P. pinaster.

In 1963 a breakaway fire from a clearing burn swept through 30 acres of radiata, pinaster, canariensis and ponderosa. There were 2 acres of canariensis in the centre of the head fire and most of this was completely defoliated and stood stark and blackened. Today it has recovered and looks vividly green with coal black stems. Some Eucalyptus patens saplings did not recover. Needless to say, the other species were salvaged.

1930 planting was done in Helena Block on a coarse gravel slope. This gravel type has a deep clay subsoil and is also supporting some high quality pinaster of excellent form. However, the dominant height of P. canariensis is now exceeding the same age pinaster and it is also exceeding the pinaster volume.

A small tenth acre plot clear felled to produce productive coppice regrowth has now produced stems of approximately 15 feet in height in eight years. The coppice stems were low pruned in 1967. Pine inventory sheets list some of this area as having 86 loads per acre though 20 loads per acre has been removed in thinnings.

In addition to these managed sections, I have observed a grove of radiata on a location at Darlington.. There are two specimens of P. canariensis also within this environment. The soil is a fine buckshot gravel on a well drained slope overlaying a laterite cap. Typical pure jarrah forest with an understory of banksia and sheoak still remains on adjacent land. This soil type is of course not suitable for good radiata growth, however the influence of stock has given sufficient fertility to permit the grove to attain a height of 80 to 90 feet.

The interesting observation here however, is that now at approximately 60 years of age, the radiata has stagnated and is slowly deteriorating but the two specimens of canariensis are still going up in a vigorous manner. One girths 6'6" G.B.H.O.B. and is 95 feet high. Four young trees have regenerated from seed up to a distance of 5 chains from the parent tree, these vary in height from six to twelve feet and appear to be making very healthy growth.

The purpose of this paper is not to hold up the species Pinus canariensis as something better than anything else, come what may, in any soil or rainfall environment. Nor is it proposed to prove anything that is not already known by those equipped to know. Rather, it is hoped by general text to bring to the fore the history of the species over the last 42 years in the situations that we are able to view today.

We know full well the great variations of our soils and the various affects of our rainfall on these soils, and we know quite a lot about where to get worthwhile results with radiata, or be rather cautious and plant pinaster. However, in between these two species and soils, lies the mediocre band - The soil that's good but the rainfall not quite enough for radiata. Or the rainfall's right but the soil doesn't quite make up to the requirements of radiata.

So often is heard the phrase "canariensis must have a radiata soil to do any good so why not stick with radiata and produce the volume at a faster rate".

Now we find that in producing this large volume of radiata - something like 200 loads per acre in 50 years - we have leached the soil to such an extent that we are in serious trouble with the second rotation and will have failed areas unless we can find the answer by heavy fertilising.

There is another expression often used "canariensis is hard to establish as tubed stock would have to be supplied to the planting site". This is quite so and some extra expense is incurred by this. What may not be realised however, is that when established, Pinus canariensis is there for all time since it has the property to coppice and reproduce a second crop on vigorous stumps.

To summarize the foregoing, the following points about P. canariensis need to be emphasized.

1. The problem of establishing 1-0 seedlings in the field is not a difficult one. Fertilising during the juvenile period as we understand it today would overcome any stagnation of root development and assist in getting young stock moving at a faster rate.

2. The drought resistant qualities of this species make it an ideal type for the planting of rocky elevation slopes, particularly on the verges of radiata areas where controlled burning may be practised to advantage.

3. The same qualities make it a worthwhile species to place under trial on good soil sites further inland to the 20 inch rainfall belt.

4. The ability of the species to survive the ravages of fire would make it the choice when planting in small pockets of high fertility soil likely to be subject to a high fire risk.

5. The quality of timber derived from both young and mature trees is high, having a much greater breaking strain than either radiata or pinaster.

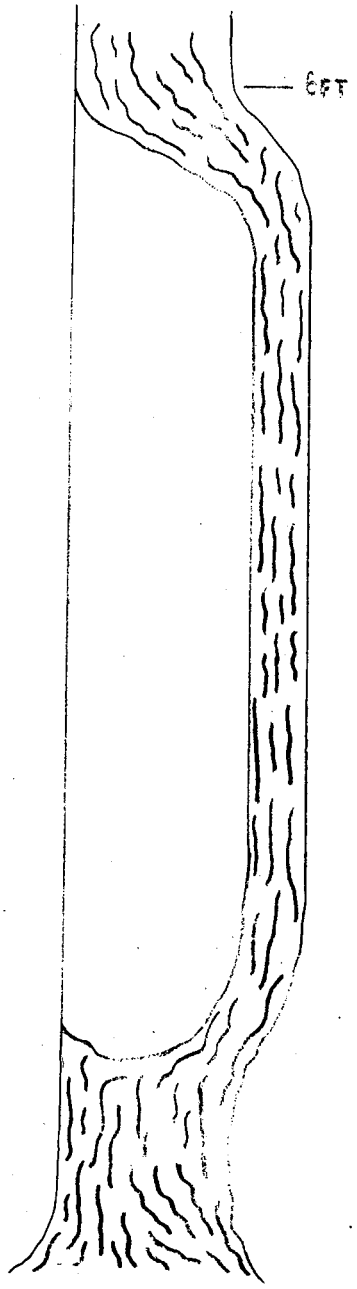
6. The second rotation as expected with radiata and pinaster would not be required with P. canariensis as over a period of 80 to 100 years an uneven age forest would be established.

7. It can be estimated that P. canariensis will produce in excess of 100 loads per acre as a rotation crop in 50 years. As a perpetual stand of uneven age it could be expected to produce 2 to 3 loads per acre, per annum.

There is just one note of warning with nursery stock. If transferred from a sheltered coastal nursery to frosty inland valleys, serious damage can occur after planting out. This can be overcome by growing nursery stock in frost affected areas so that there is no change in their environment after lifting.

LIFELINE

By J. McCormick



Jarrah's ability to recover from fire is well known, yet I would like to record the case history of one particular tree at Dwellingup. This tree was subjected to intense fire treatment which resulted in complete crown scorch and partial defoliation.

Seven months after the hot burn treatment the dead bark was cut away revealing dry side to a height of six feet above ground level. The dry siding was complete around the circumference of the bole save for a half inch strip of living bark connecting the upper bole to the base of the tree. This narrow strip of bark, which grew away from the main stem, became the tree's sole lifeline. Fours years have elasped since the tree was burned, during which time the narrow strip of bark has developed in to a secondary 'bole' four inches in diameter. The tree itself appears to be otherwise quite healthy.

A dendrometer band was fitted to the tree immediately after de-barking and its girth growth measured at monthly intervals for three years. Its growth for this period was compared with the mean growth of twelve control trees (measured at 10'6").

Commencing seven months after burning the growth results were:-

		Single Tree Single Tree	Twelve Control Trees (Mean)
Basal area		.7362	.7137
Total growth	1st yr.	.39"	.34"
	2nd yr.	.20"	.26"
	3rd yr.	.03"	.14"
	Totals	.62"	.74"

In spite of the heavy seed year just experienced, this stalwart tree is not going to give up the ghost.

SAFETY IN TREEMARKING.

By C. J. Edwards.

The following notes were prepared for discussion at a Pemberton Safety Committee Meeting. It was intended that they be made available to the treemarkers of that Division in the interests of improved safety in this aspect of forest work. It has been recently suggested to me that the notes are worthy of wider publicity by means of inclusion in Forest Notes. Therefore they are submitted without prejudice or apology - "So that men that mark may read."

1. Tree marking involves walking in the bush under varying conditions of scrub density and topography, therefore:

   (a) Walk carefully and be conscious of the many varied "pitfalls" which may cause a fall. Stop, don't continue to walk when examining a tree crown.
   (b) Carry the axe safely so that if you fall, the axe cannot harm you. (It is unsafe to carry the axe over the shoulder in scrubby bush). Recommended method - carry the axe in the hand, grasping the handle very near the head and holding the axe at your side perhaps a fraction behind your body with the blade angled away at 40° +.
   (c) Ensure that you do not stand on or close to bull ant nests when examining a tree that may require marking.
   (d) Wear your safety helmet.
   (e) It is a good idea to wear gaiters - prevents frayed cuffs or drill trousers catching scrub and causing a fall.
   (f) Wear boots with a non-slip sole. (Safety boots are preferable). The use of "logging spurs" in Karri country is desirable.
   (g) In wet weather be extra careful when stepping on and over logs which may be very slippery.

2. Blazing or cutting a toe mark on a tree.

   (a) Hold the axe with a relatively short handle - to give more control over the axe in case of a miss hit. (Particularly in blazing).
   (b) Be wary of dry siders - the axe may slide off more readily.
   (c) Make sure you have room to swing the axe free of scrub.
   (d) Ensure that you do not leave cut off scrub stubs that may cut your knuckles on the down swing when making the toe mark.
   (e) Watch your knuckles when blazing or cutting a toe mark - particularly when the blaze or mark has to be on an indentation in the tree.

(f) Make sure your axe is always sharp, that the head is on securely and the handle is in good, clean, smooth condition.

(g) When it is practicable to do so - carry your axe with an axe guard on.

3. General safety

(a) Make sure you always know where your fallers are, and make sure that the bush crew knows fairly accurately where you will be working.

(b) Be alert when walking in freshly cut over bush, especially in high winds - hanging branches are dangerous. If the winds are very strong it may be best to cease tree marking.

(c) Be conscious of the fallers' safety.

(i) Don't mark trees in such a direction that it could be dangerous to fall - or advise the faller of the danger.

(ii) If it is doubtful that a tree will go in the direction marked, give an alternative toe mark (if possible).

(iii) Ensure that you are far enough ahead with T/M to allow safe working conditions.

(iv) Don't tolerate two fallers working on the same coupe and don't tolerate any clearly unsafe working conditions, notify the bush boss and your immediate senior officer of the circumstances.

Silviculture of Karri (Eucalyptus diversicolor F. v. M.) in Western Australia

By O. W. Loneregan

(Editors Note: the following article is a summary of a longer article submitted by the author to the Editors of "Australian Forestry". The opinions expressed and the conclusions reached are those of the writer).

SUMMARY

The composition and structure of the virgin stands, management methods for sawlog production and felling and regeneration methods are described. The growing stock is large, the rate percent is small: this is the most valuable increment in these stands. The basal area increment reaches a maximum in vigorous standards of about four feet diameter.

Treemarking and felling in the primary cut is carried out under the group selection system in healthy stands; and under the uniform system of clear felling with seed trees in the unhealthy stands. Two categories of fellings are required in both methods: the primary trade cut, or seeding felling for regeneration and protection; and the secondary felling, when the regeneration is well established at about 18 months after burning.

The probability of un-marketable trees today becoming marketable tomorrow is recognised in the application of the sele ction system. Only those which would hinder karri regeneration may be removed as a general rule from the gap centres to within one chain of groups of karri standards or seed trees. The minimum gap for satisfactory development of the karri seedlings is about 0. 4 acres or two chains diameter, and the maximum width up to six chains for seeding may be accepted. Three dominant or co-dominant trees each of nearly one chain crown spread can be expected to produce 160, 000 seeds in a moderate year. This seed supply is adequate for seeding two acres of freshly prepared seedbeds under all systems of silviculture for natural regeneration. The tree percentages for establishment of the seedlings ranges from 0. 6 to 2. 8 percent of the seed shed.

The length of the floral cycle is either three or four years, and seed production also varies. In a good year, the average seed tree produces 250, 000 seed (0. 75 lbs); and about one quarter of this in a moderate year; and no seed on an average of two years in three. Careful sampling of the stages of development, and seed testing are carried out to provide reliable estimates of the seed supply. An

estimate is made from measurements of the factors involved and multiplication of these factors: (i) the numbers of components per twig in the actual samples, (ii) the expected reduction in numbers reaching maturity and following seed shed, Fig. 1 (iii) the basic number of twigs produced annually in karri crowns, and following seed shed also, (iv) the actual crown area, Fig. 2.

In the dense regeneration of karri, the earliest tending now is producing the largest crop trees most rapidly. The response indicated is ten times as great as thinning later in pole stands and indicates the length of rotation may be reduced from 120 years for example to 80 years. Growth rates are most rapid and productive in ashbeds, and unproductive without the ashbed effect in the observed treatments. Response in volume production in $5\frac{1}{2}$ years is two times greater with reduction of competition in the first year of establishment of the karri seedlings; and three times greater with heavy fertiliser amendments at the time of thinning, than without these treatments. The initial advantage as demonstrated by growth on ashbeds is maintained during the life of the managed stand. A clean floor, in gridded strips lasting for many years is created by mist blowing with chemicals for uncrowding in regeneration when the seedlings and competing scrub are at a height of from 6 to 12 inches. This is a very important treatment because access is provided for subsequent thinning and fire protection requirements: without this treatment, access is impossible during the most productive period of growth of the stand.

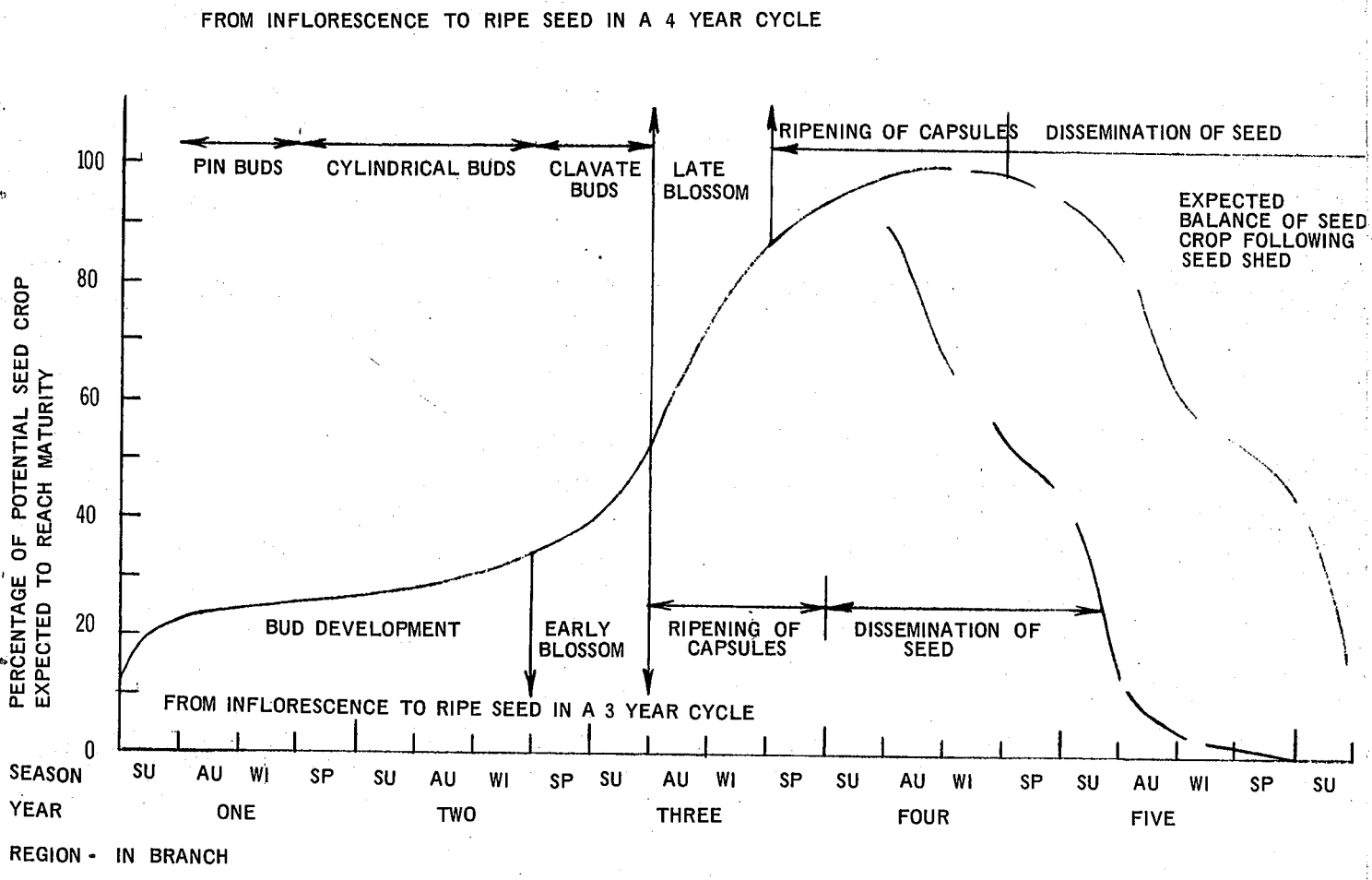
How thinning treatments straddle a balance between with loss, and without loss in volume production for a gain in size is demonstrated by a crown thinning trial in a pole stand. A response of 22 percent greater increment in merchantable volume also is demonstrated 40 years later in a second growth stand thinned at the age of 53 years, than in the un-thinned.

Crown spread measurements of well formed healthy crowns of the largest crop trees indicate a crown ratio of 18 in crown/stem diameters for karri (and of 15 for jarrah). Consequently healthy stands fully occupying the site are gauged to maintain high volume production in the range of 80 to 130 square feet per acre for karri (and of 80 to 110 for jarrah). By transforming basal area into its main components (stem numbers and average girth) prescriptions are shown for intermediate thinnings. Half of the stem numbers in a critically well-stocked stand can be removed without reducing the value of volume production. Other principles applied when thinning any stand are that

the spacing per tree varies inversely as the number of trees; and the spacing per group varies from the spacing per tree, as the square root of the number of trees per group. Thinning of high quality jarrah and karri stands to ideal densities is recommended through the application of these principles: where d = stem diameter in inches,
and D = crown diameter in feet:
the spacing in feet for 1 stem is either 1.75d" or 1.4D';
the spacing in feet for 2 stems is either 2.5d" or 2.0D';
the spacing in feet for 3 stems in either 3.0d" or 2.4D'.

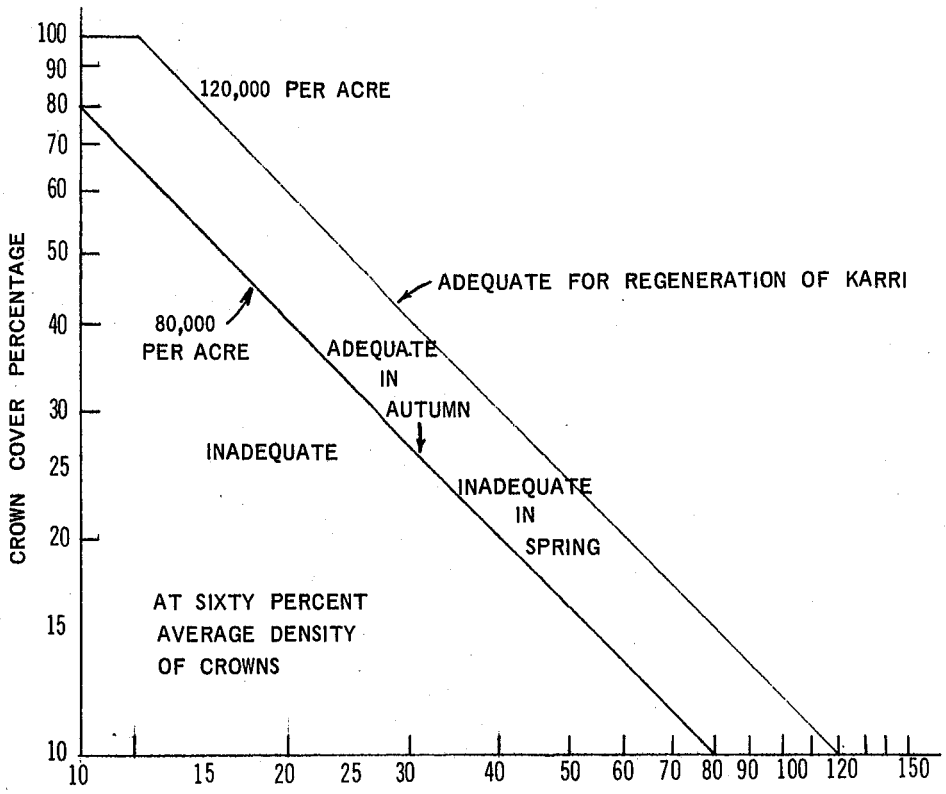
Scientific practice and principles are being followed up and demonstrate how the rotation may be shortened in matters connected with the seed and growth of the seedlings. The control of a desirable system of silviculture, the increased production of saleable wood and protection are made possible through the silvicultural use of fire with the assistance of chemicals. The basic methodology in part is intended to follow Troup, "Silvicultural Systems" (1928).

FIGURE 1



Graph at each stage of floral development through P. Christensen (W.A.F.D. 1968) showing the percentage of the potential seed crop which may be expected to mature.

FIGURE 2



Graph of seed supplies required in regeneration of karri, showing 80,000 seeds per acre in autumn and 120,000 seeds per acre in spring for the percentage of crown cover and seed production measured from samples of the branches of the crowns.

REGIONAL NOTES

1. HARVEY REGION

Staff

Ron Nightingale who first joined the department from East Africa in 1963 and then left to private enterprise has rejoined the department and been reappointed to Harvey Division.

Forester Jim McKay has resigned to take up a service station near Bunbury.

Les Head of Hamel has resigned and has been replaced by George Chalmers.

Silviculturalist Alex Hart has recently made one of his visits to the wheat belt areas where, it may not be generally known, the department has many species trial plots especially in salt affected country.

Mine Timber:

Recently the department has been successful in its drive to have the mines use more round timber in lieu of split jarrah and a greater proportion of untreated round material is finding its way to the mines. Further trials with treated round material are continuing.

Heavy Duty Cum Gang Truck:

The prototype of this unit is now in service at Collie. A second is under construction. Trevor Butcher of Collie has initiated a commendable project in planting trees on the banks of the Collie river. Some of the credit will inevitably rub off onto the Forests Department.

Radiata Planting:

There is some evidence that the planting of radiata in the deep sands of the Collie basin, providing suitable fertiliser is used, could be successful.

Baulk Bench:

A separate baulk bench is now in operation at Harvey. It is constructed in such a way that to add another bench is a simple matter.

Logging Equipment:

A half track and winch is on order for use in the hills at Harvey Weir.

New Tower:

A new fire tower is envisaged this year for the coastal plain west of Harvey.

New Airstrip:

A new marled airstrip, 8 miles west of Harvey is now completed and in service.

Fire Control Problem:

Some of the regeneration resulting from the 1961 Dwellingup fire is now approaching a height which will permit safe control burning. Initial problems in burning in heavy fuels under these conditions are being encountered and until such times as the fuel can be safely reduced, an extremely dangerous situation will arise if a fire occurs. So acute is the problem, that in the event of a fire, similar action as is required for a plantation fire is planned.

2. BUSSELTON REGION

Refuse Burning:

Refuse burners for sawmill waste are becoming more common at sawmills these days, a trend which will gladen the heart of every Forester who has memories of "escapes" which took considerable time and effort to control.

Of those seen, probably the largest is the one that Douglas Jones Pty. Ltd. have installed at Nannup. The burner is 95 feet in diameter at the base, 115 ft to the apex and designed to burn 160 tons of waste, wood, bark and saw dust in an 8 hour shift, with individual pieces up to 35' in length and weighing 5 tons.

3. METROPOLITAN REGION

Staff

George Reynolds, who will be well known to a very large number of officers throughout the department, has now retired. George was in poor health for some months. He will be missed by all those who have been associated with him.

Fire Training:

After elimination trials in the various divisions, four teams of local champions gathered at Mundaring on December 13th to compete for the title of top fire gang in the northern area.

Competitive teams consisting of overseer and four men came from Wanneroo, Mundaring, Dwellingup and Kelmscott, together with their DFOs and non-playing coaches.

The morning is taken up with a fire suppression exercise in which each gang must find a fire from a six figure map reference and points are awarded for map reading, reporting, fire attack and mopping up. Each gang and its vehicle are inspected before and after the event for correct clothing, efficient stowage and maintenance of tools and vehicle. Progress points at mid-day were:

Kelmscott	77.5
Dwellingup	75.5
Mundaring	73.0
Wanneroo	69.5

The afternoon is divided into two main sections, using the light-duty truck and equipment first and then the heavy duty hose run. Pumpers, chainsaws, packsprays and shovels are used in the first section, and the final "blue ribbon" event is a hose run, involving 4 lengths of hose, a y-coupling and two short hoses, followed by an exercise in handling wet hose. Final points were:

Kelmscott	158.5
Mundaring	149.5
Dwellingup	145.5
Wanneroo	125.0

Congratulations to Kelmscott Division and to their representatives, Overseer Bill Saunders and his gang.

Pine Logs - Particle Board:

Westralian Plywoods' second particle board factory at Kewdale has been working 2 full shifts for about 7 months now and delivery of pine logs is being maintained at 100 loads (overbark) per day. This might not sound much compared with large jarrah and karri mills, but is must be remembered that there are approximately 70 logs per load (OB) cut 7'9" long.

This means that 7,000 logs, or 10.25 miles of log are delivered to the factory per day from seven different plantation centres. The VK-16 debarker has not had a serious breakdown from debarking 1000 miles of logs, which gives an indication of how efficient this machine is.

Logs for the factory are drawn from Gnangara, Collier, Somerville, Mundaring, Gleneagle, Myalup and McLarty plantations and it is of interest that 15 pine fallers produce this wood and there are only 10 men per shift at the automated factory.

4. SOUTHERN REGION

Logging Spurs:

Over the years, the number of accidents resulting from slips and falls in the bush is very high. In the karri country and particularly in wet weather and in cut-over bush, the footing is at best uncertain and at worst treacherous.

At Pemberton recently, the use of "logging spurs" has been tried to overcome the problem. These comprise a set of short aluminium sprigs which are strapped onto the boot. Two spikes fit under the instep and two under the heel. The spurs have now been tried for a period of six weeks by treemarkers and members of the safety committee and have proved quite successful. They are very light and give one great confidence in walking over greasy logs and slippery surfaces.

SAFETY NEWSLETTER

SECTION

CARELESSNESS, ACCIDENT PRONENESS

ITS USE AND ABUSE.

Everyone is subject to accidents.

Having them or not having them depends upon the number of unsafe acts committed and unsafe conditions encountered in a given period.

Misconception and over-emphasis of the accident prone theory could lead to a lot of misdirected effort.

What is Accident Proneness ?

Usually "Accident Proneness" is described as a combination of human abilities which make a person highly proficient in bringing about accidents.

In any discussion of the accident proneness problem, it is likely someone will tell the story of the man who is always getting hurt. All that speaker is doing here, in branding the unfortunate person "accident prone", is demonstrating inability to find why these accidents occurred. There are understandable reasons for all of them. The problem is identifying the causes so they can be eliminated.

Accidents do not just happen. Every accident has one or more causes. The causes may be external to the individual, they may be within him, or they may arise from both sources.

The investigator must have enough skill and knowledge to identify the cause, taking into account such things as physical condition, mental attitude of the victim, lack of training or inadequate supervisory direction.

The significant job factors must not be overlooked. Has he been given sufficient instruction in his job ? Is he fully aware of the correct methods of working and the hazards around him ?

It is therefore necessary to understand that even though accident repetition is associated with the individual its cause may lie in incorrect supervision, environmental factors, lack of knowledge, skill or training or a combination of two or more of these factors.

CARELESSNESS:

Carelessness is usually emphasized as the most important of the causes of accidents which lie within the individual. But carelessness,

as a word used in accident prevention is of little value. The word explains little and in fact, misrepresents the causes of accidents.

It is a useful excuse for some who assent that all accidents are due to carelessness and imply that the maintenance of safety is merely a matter of getting people to "care". The operator who adjusted his machine while it was in motion - even though the safe practice was to stop the machine before making adjustments - and lost the tips of his fingers would not agree that he was careless, that he did not care if he was injured or not.

His reasoning was that he did not want to take the time to stop his machine then start it up again, but of course he did not think of the time wasted because of his injuries.

Carelessness as a given cause of accidents, neither describes or defines the causes of accidents. Instead it is used like a blanket to hastily toss over accident facts obscuring the truth and permitting the loss of the accident details.

BELTS GIVE BEST PROTECTION.

The three-point, lap-sash belt is recognised now as the most effective safety device in the modern car.

Research has shown that it offers full protection against fatal injury in a smash at speeds below 60 m. p. h.

Also it substantially reduces the frequency of injuries of all kinds, particularly those to the head and upper body.

But even when belts are fitted, the percentage of drivers and passengers wearing them is low.

This complacent attitude exists in this State, where seat belts have been going into new cars for more than 12 months.

"The latest research on the value of the lap-sash belt was conducted in U.S.A. 1967-68." It is an analysis of more than 28,000 smashes (mainly between two vehicles) in which 37,511 unbelted and belted front-seat occupants were involved.

The average injury-reducing effect of the three-point harness varied between 40 and 90 per cent. Occupants not wearing the belts received fatal injuries throughout the speed range, starting as low as 12 m. p. h.

None of the car occupants wearing the belt was fatally injured at accident speeds below 60 m. p. h.

The belt also proved effective against ejection from the car. The risk of fatal injury increased more than ten times with ejection, compared with staying in the car.

More than 98 per cent of the cars involved in the research were equipped with the three-point belt but only 26 per cent were being used at the time of the smash. The use frequently rose with the increasing age of the car occupant.

The 18-24 age group predominated in the analysis of drivers involved in the 28,000 smashes. The number of 20 year old drivers involved was three times higher than the number of 45 year olds.

Further, the young driver was a lazy belt user. About 16 per cent of the 20 year old drivers fastened the belt provided, against 30 per cent of the 45 year old drivers.

The value of the three-point belt was that it allowed big restraining forces to be applied to the body without serious injury.

Calculations showed that other safety features, like energy-absorbing front ends, would have little protective value unless the car occupants were wearing the lapsash belt.

The W. A. National Safety Council is aiming its seat-belt campaign at all who travel by car. It is looking for the influential member of the family, father, mother or the eldest son, to give the lead to others in the car.

RECORDS & STATISTICS.

It is extremely pleasing to record that at the end of the first quarter of the current year, the Departmental frequency rate has continued to fall.

Standing at 65 on the 1st July, 1968, it has now reached an all time low of 57.

This gradual decline in our frequency rate is the result of a growing safety awareness in most divisions, plus the realisation by officers and employees that the benefits that accrue from an efficiently run accident prevention program makes the effort worthwhile.

Divisional accident statistics for the quarter ended 30th September, 1968 have been included in this edition.

The accident frequency rate graph for Kirup has also been included to illustrate the success now being achieved in this division.

DIVISIONAL ACCIDENT STATISTICS QUARTER ENDED SEPT. 1968.

Division	JULY	AUG	SEPT	F.R. BASED ON 12 MONTH PERIOD.
BUSSELTON	1	NIL	2	39
MUNDARING	NIL	1	NIL	98
DWELLINGUP	1	1	NIL	35
COLLIE	NIL	NIL	NIL	7
KIRUP	NIL	1	NIL	81
MANJIMUP	4	NIL	NIL	46
NARROGIN	NIL	NIL	NIL	No previous figure
KELMSCOTT	NIL	NIL	1	40
COLLIER-SOMERVILLE	1	NIL	NIL	101
WANNEROO	2	1	3	94
HARVEY	2	1	4	105
PEMBERTON	NIL	NIL	NIL	48
NANNUP	NIL	NIL	1	91
SHANNON	NIL	1	NIL	62
TRAINEES	NIL	NIL	NIL	77
W/PLANS	NIL	NIL	NIL	No previous figure
RESEARCH	NIL	1	NIL	" " "
	11	7	11	
1967-1968	14	18	10	

KIRUP DIVISION FREQUENCY RATE