Controlled Burning in Relation to Fire Control

The following notes have been compiled from practical experience with controlled burning during the Spring + Autumn months -

Operations have been confined mainly to —

(1). Untreated country carrying advanced sapling stands containing a small percentage of A Grade sticks.

(2). Firebelts of non Jarrah or second quality Jarrah + Sheoak country.

(3). The reduction of the fire hazard in some of the earlier treated areas carrying advanced sapling growth (treatment consisted of rugbarking overtopping Marri + useless Jarrah + the thinning of good groups.)

In the untreated country of the Dwellingup district sufficient leaf litter will accumulate to carry a fire every year, the intensity of the fire depending on @ the density of the saplings;
@ the Amount of Banksia + Sheoak present;
@ on the type of undergrowth;
@ + on the severity of the previous burn. (whether burnt in the Spring or Autumn months.

@ The density of the saplings :—
The thicker the stand the greater the leaf fall + the more twigs + bark. on the other hand you have less undergrowth, + reduction in temperature + slightly increased humidity

until such a time when the canopy closes & naturally dominates surface herbage, light controlled fires should be put through periodically, to guard against the serious damage which inevitably occurs ~~through~~ ~~keeping~~ when an uncontrolled fire starts up on a hot day on accumulated leaf litter & heavy scrub growth.

A fire starting up in country unburnt for 5 years for instance with only a slight wind on a moderately hot day soon develops into large proportions & becomes exceedingly difficult to check. On a 100° day a fire in this unburnt country starting up at midday with a slight wind would be impossible to put out on the face during the heat of the day.

It only take a few minutes for it to get under way under these conditions. & the only chance is to get well back & start a backfire. Fire will start up 20-30 chains away with these really bad fires, so it is useless making your backfire less than 50 chns away depending of course on the force of the wind. In any case a considerable area is bound to be damaged under these conditions

It rarely happens that a fire starts up on the edge of a treated ~~compartment~~ on a blow up day with

the wind blowing into the compartment - but lucky play with chance when a fool proof method of fire control can be adopted by judicious controlled burning worked in conjunction with regeneration operations.

The foregoing eulogy on the practibility or rather impossibility of extinguishing a fire in really dirty country is no idle statement but comes from the knowledge of a close observation of controlled burning with ~~of~~ fire in untreated country, a great deal of which had not previously been burnt for periods of 5 up to 10 years. throughout the Dwellingup district & with final burning burning heaps & advance burning through treated compartments

It is impossible to find 1000 acres of forest in a solid block in the Dwellingup area which has not been subjected to some sort of a controlled burn within the past 3 years so that fire control now is more or less a simple job to what it will be if left unburnt for say 10 years

The fact that ~~to~~ ~~bug pc.~~ all blackboys are cut down & a big percentage of Banksia & Sheoak has been removed in the older treated areas has reduced

the fire hazard considerably, but does not alter the fact that when the regrowth gets to the sapling stage accumulation of leaf litter will ~~state~~ then be increased + the fire hazard will rise as time goes on.

The presence of standing dead ringbarked trees ~~will~~ in ~~part~~ treated areas will always mean a grave fire risk if your compartments are all duty underneath. If a fire gets going on a blow up day the rate of spread is enormous on account of the fire running up these dead trees + throwing sparks which start fresh outbreaks up to 20 chains away. 2 miles

If however the floor is reasonably clean underneath you stand a fair chance of stopping it. for it is quite a sensible health + comfortable fire

(2). Now with regard to the type of surface vegetation, I have insufficient data to be able to draw up a list of species with their relative degrees of inflamability the new growth of some spp of undergrowth will resist fire for several years. after burning, ie, they have to become woody before they will burn freely. (viz the western portion of the Mannum working Circle ~~Comp 4~~) + then again some species are highly volatile + inflamable even in their succulent state.

There is no doubt that a fire approaching a sapling stand will use up a certain amount of its heat upon reaching the shaded ground. I have noticed however with uncontrolled fires of the past, that, ~~on a hot day~~ at midday or the average hot summer day there is little or no difference in the rate of spread after the fire enters the sapling stand - In account of the extra fuel it gathers in intensity running up the dry bark of the saplings in many cases burns the tops of the lower suppressed members & severely scorches the dominants - The extra height of flame causes more draught so that if anything the fire spreads quicker

In the early spring months however a controlled burn can be put through these sapling stands so as to just trickle through without the slightest damage to the saplings -

The fact that very few sapling stands are sufficiently developed in the crown to have closed canopy, means that there are openings through which the sun, particularly at midday, shines through & dries up the air through the stand on a really hot day (in Jan & Feb.) therefor the humidity is not high & what little there is is affected (soon dried up.) by the extra heat from the accumulated (hot draught from the opening fire.)

The greatest damage to regrowth in the past has occurred on the lower slopes ~~of~~ bordering the creeks or flats where the undergrowth is 2 + 5 feet high consisting ~~3~~ with of one or more of the following species Zamia (dense) Blackboy, Bracken, Thomasia, ac stinjosa

The bracken Thomasia country is hard to burn in the Spring on account of its succulency + should be left for autumn burning.

With the really first class Jarrah country there are no blackboys + very few Zamias - and --

3. Understorey :— when there is a big percentage of Banksia or Sheoak present the stand ~~is~~ the leaf fall is particularly heavy + with the country a fire will travel over it every year. With Sheak in particular a carpet of needles collects a few days after a burn so that Sheoak country burnt in the Spring will carry a light fire again in the heat of summer (Feb + March) of the ~~same year~~ same season.

Summary on intensity of damage to Regrowth :—

It will be seen that the degree of damage a fire will do, & the rapidity of its spread, does not depend entirely on weather conditions, but to a great extent on the density of the undergrowth & amount of leaf litter.

From a weather point of view, the worst day or "blow up" day as it is termed is a combination of high temperature, low humidity, & high wind —

It is creating a false sense of security to say there are only 3 or 4 ~~of these~~ bad days in a season ~~& there are~~ namely the "blow up" days.

You will find if the floor is dirty, a fire will burn fiercely on only a moderately hot day with only wind as a helping agent; A fire ~~will~~ warms up the atmosphere ahead & therefor does not necessarily need a hot day or the direct rays of the sun to make a fierce blaze, providing of course the fuel is dry.

~~to~~ Fires will often burn right through the night between Jan. & March when you get the temp does not drop below 85°

The floor has to be particularly dirty for a fire to ~~travel~~ keep burning between the

hours of 4 & 6 in the morning
when you get the minimum
temp & increased humidity &
often slight dew.

It is at this time therefor
that the large fires outside of
treated country should be tackled,
usually all that is necessary
then, is to throw in the smoulder-
ing ends, & douse the larger log
or burning trees with water or soil.
It may be necessary to burn
around any tree which has a
good hold high up beyond
the reach of a knapsack spray.

It is most important that all
fires should be patrolled until
absolutely safe.

Controlled burning has in the past been left in the hands of men who do not realise the susceptibility of the Younger Jarrah (up to 10ft) to scorch on warm days, & who often fail to take opportunities to burn on ideal days. Really not altogether the fault of the overseers but often through the officer in charge having too much other work on his hands to be able to give full attention to controlled burning - This position has been considerably eased now that all the extremely dirty areas outside of treated country have, within the past two years, been bleeded up.

It has taken a long time to instil into the minds of overseers that controlled burning under good sapling stands must not be done in the heat of the day & to bear in mind the fact that all country whether treated (ie burning of coppice) or untreated must be protected from fierce fires, & the only way to do this is by C B under conditions of absolute minimum scorch.

These conditions are experienced during the Spring & Autumn months.

The actual time to burn is determined by trial on the ground & commences broadly speaking as soon as the fire will run about slowly making a fairly clean job of burning up the leaf litter & undergrowth.

No set dates can be given because a fire will run about in the depth of winter after a weeks spell of sunny weather.

Generally for the Spring burn operations begin early in September depending on weather conditions + can be carried on with safety up till such a time when the grass in the open fields or P.P. locations dries up. (Gen about the 20th November)

Spring burning after the end of November becomes too hazardous unless a complete block is burnt, mainly because the fire will run up dead trees + catch the large logs, these smoulder for days + if on the edge of the burn become a source of danger.

Autumn burning can be done after the first heavy rains, often at the end of March, + from then on when conditions are suitable, until the winter rains set in.

Rain usually falls intermittently during the spring burning season, often in weekly cycles, so that the lower leaf mould + the large twigs + wood is damp, whilst the surface leaves + smaller twigs are dry enough to burn. Consequently the spring burn particularly early spring, is never so clean as the autumn burn (in the Knysna-Bankenia country) ~~in many instances~~ a fire will run over the top dry leafy litter + leave as much as an inch of moist leaf mould unburnt. in places enough to carry another fire in the heat of summer.

Except in very dusty localities, spot burning is a waste of time, ie if the fire goes only spreads a few yards + then goes out it is better to leave it until such a time when it will travel about + clean up. Spot burning is unsatisfac

not only because it doesnt make a clean job but because a fire will travel straight & over the same ground later in the year.

It is not a difficult matter to put a fire out where the leaf litter is broken & there, any country of this nature, should be left for further accumulation before attempting to burn.

Controlled burning in practice needs the finest judgment because there are so many influencing factors governing the time to burn, that rule of thumb methods cannot be successfully applied.

Burning conditions vary with :-

(1). the locality (2) time of day
(3) temperature & relative humidity.
(4) moisture content & density of the litter & undergrowth.
(5) type of undergrowth & sub storey.
(6) direction & velocity of wind.

NB on (1). The locality.

The hilltops & higher ground dries first after rain & generally carries the more drought resistant & inflamable types of undergrowth & burns much earlier than the lower slopes & flats. In the flats particularly, humid conditions are experienced until the beginning of December, when, under the direct rays of the sun ~~& sett~~ the bullrush & melaleuca types will burn even on top of water. After the sun goes down however. a fire even in the hottest months will pull up on the moist flat country.

(2) Time of day.

In the 1933 spring burning season there were actually 17 working days when conditions were suitable for controlled burning. In the first 6 days (in September) burning could only be done from 12 noon to 4 pm before or after which times, the fire would not run.
During October & until Nov 21st burning was done between the hours of 10 am & 4 pm. At 6 pm the air cools down & the fires (burning in dense undergrowth) with few exceptions were out by nightfall.

This year we had little spring burning to do, but actually commenced operations on 26th Oct but rain set in & delayed the work until 2nd Oct up to date 20th Nov. there have been 30 days suitable for CB operations. Burning was carried out (except on areas carrying young Jarrah up to 20 ft.) between the hours of 10 am & 4 pm, for country outside of treated areas, & 8 am to 5 pm for heaps of debris & tops in treated country. (only ideal days selected - see on)

It doesn't matter how dirty the area may be you can burn it without injury to the ~~younger Jarrah up to 10ft~~ crowns of anything over 10ft high. if let after 4 pm or to be on the safe side 5 pm. for anything exceptionally thick.
The fire will only travel a few chains at the most when the cool air automatically extinguishes it.

(3) Temperature & Rel Humidity.

Readings taken this year at our local weather station have shown that ~~temps~~ max shade temps of 65 - 70 with 32 %. relative humidity are suitable correlate with ideal controlled burning conditions.

Conditions on the spot however vary so much under the direct rays of the sun that screen readings ~~are not always~~ cannot be relied upon to give the true indication of C B weather.

I would suggest a portable thermometer for use during C B operations on the job. The actual time & temp a fire fizzles out & the behaviour of fire under the direct rays of the sun & under overcast conditions can then be determined.

(4)

Moisture Content & density of the litter & undergrowth.

During the C B season after heavy rain (75 points over) it usually takes 2 days wind & sun before the surface litter dries sufficiently to carry a running fire again. Exceptionally cool conditions with morning frost & will often make burning impracticable after rain for ~~over~~ a week or more.

Wind is a big factor in drying up the duff.

This year we had exceptionally heavy falls on 4 & 5 November, & it was thought that in consequence the fire season would be late commencing. ~~Hugh~~ ~~the~~ winds with overcast conditions however were experienced for 5 days after the rain so that when the sky cleared & temps rose the fire hazard on the 21st was just as bad as last year.

The larger wood does not dry enough to burn until the second week in November.

Often on a comparatively cool day fire will generate quite a lot of heat & run up tree if the leaf litter & undergrowth is thick.

[illegible] of [illegible]

[illegible] a strong [illegible]

[illegible] of [illegible]

[illegible] a strong [illegible]

[illegible] today for this position.

(6) Direction + Velocity of wind.

This governs more the position to burn rather than the time of burn.

Certain firebreaks for instance can only be burnt in safety with a wind blowing away from the compartment. or perhaps you are trying to burn a flat nut + need a drawing wind into the flat to get it going properly.

"Tarby dusty localities can be burnt safely if you have a wind lying in one quarter. You can then light up on the edge against the wind + let the fire work slowly back against the wind.

Ideal C B conditions are not always made to order. + often an ideal day (right temp humidity etc) may be spoilt for a certain locality, by an adverse or choppy wind.

An experienced man can alter his plan of burning to suit or utilize wind from all quarters. but if the wind is choppy + there is any risk of the fire jumping over a break or getting out of control a beginner should be on the safe side + not light up in that particular section.

A fire can often be made to travel long distances in a short time without damage if you can make use of a cold drawing wind.

A good example of this was Compt 13 Holyoake burnt at the end of last spring. this was let up along the W+GR line + travelled over a mile in the afternoon before a drawing south wind through advanced sapling stands - the height of scorch in this instance was 4 ft.

ellers who are detailed for controlled burning operations should be trained by an expert.

a. a man who has had practical experience with all phases of CB + fire fighting methods. + who can choose to a nicety the days to burn without causing damage to the stand.

It is necessary that practical demonstrations be given in all types of country + under varying conditions of weather - (temp rel humidity + wind force)

An overseer once trained should be given a working circle + made responsible for CB. operations, + also for the suppression of any outbreak on that area.

The Officer in charge should have at least 2 weeks free in every spring season to go through his district + make himself thoroughly conversant. with the condition of all blocks in relation to fire control, issue, the necessary instructions. + where possible superintend. any CB ~~operations~~ that needs doing. Live men only required.

An idea prevalent among overseers in connection with fire damage is, that as long as the leading shoot of the sapling remains green it will not be seriously affected. It is however obvious that any large reduction of leaf surface by scorching must mean considerably lowered vitality + loss of increment. If a fire is hot enough to scorch up to 20 + 30 feet. damage must result to the cambial layer of the lower stem as well.

The height of scorch varies with the dryness + amount of debris on the ground. Given average CB. conditions if a fire is let after 4 pm the height

of scorch never exceeds 5 feet.

I have noticed repeatedly in the past when C B through sapling stands was not done under condition of minimum scorch ie burnt before 4 pm, + also with many uncontrolled fires, scorching up to 50 ft that a good A Grade stock is the last to scorch. in fact with most fires it is a rare thing to find an A Grade stock completly scorched.

This is no doubt due to the fact that in a group, the lower suppressed trees (understorey of present) takes the brunt of the heat rising from below + protects in a measure the crowns of the dominants from injury.

The dominants also have a much more bushy vigorous crown + have laterals for quite a distance down from the growing point, so that, even in the heat of the day, the lowest leaves are the only ones that scorch.

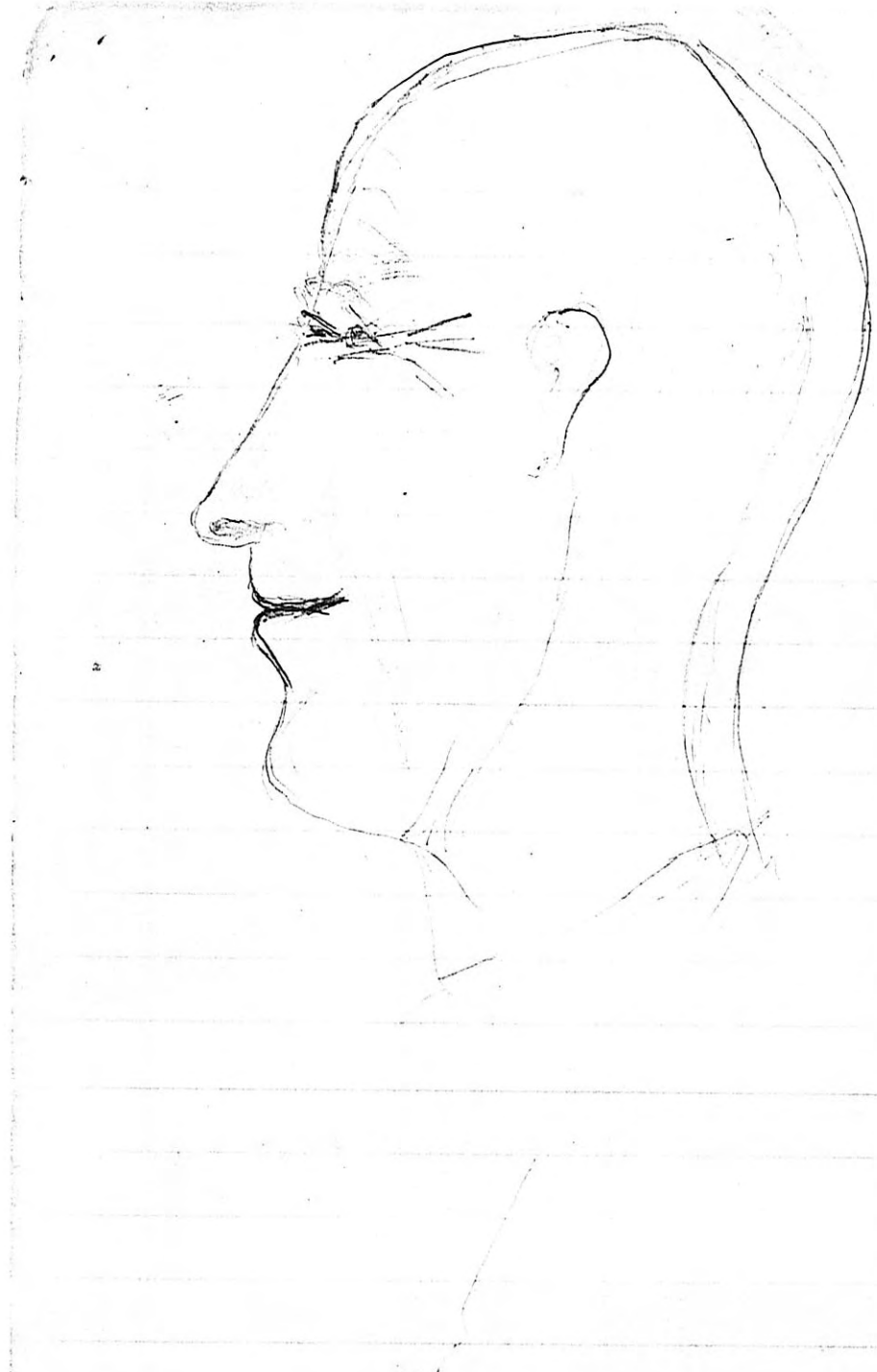
A question which arises + up to date, to which no defenate answer can be given is; whether the continued burning of the leaf litter is detrimental to the growth of Jarrah, or not.

Leaf litter performs two very important functions.

(1) Acts as soil cover.
(2) Provides humus for soil enrichment.

(1). Soil cover in a forest is necessary, to protect the surface layers from excessively hot or cold conditions.

In Australia we are concerned more with excessively hot conditions



In the Jarrah forest we have during the summer a period extending over four months, without, or with very little rain & with high temperatures often in the vicinity of 100°. It stands to reason under these drying conditions a certain amount of soil cover is needed, to prevent loss of moisture through the surface layers, particularly so in the more porous or sandy soils.

This explains why Sheoak & Banksia shed so many leaves. Sheoak is invariably found on sandy soils (with & without ironstone). While Banksia usually grows on shallow soils (not necessarily sandy) overlying rock.

Both of these habitats would unless protected dry out excessively under the direct rays of the sun.

NB. Banksia has a big leaf bearing surface because it derives the bulk of its moisture from the atmosphere. Noticed Banksia rung 18 months ago still green & healthy looking -

Nearly all the areas treated on Banksia country have not been successful because too much valuable shade & soil cover was removed - A dense stocking of Jarrah can never be obtained in pure Banksia country because there is not enough moisture available to carry more than a certain number of trees per ac.

You will notice on cut over bush that there are usually only about trees per ac & these are generally short boled. The exception occurs where a tree has managed to get it's root down between the rock. to tap subsoil moisture.

Refers only to pure Banksia bush

outside of the Bankasia country in
first class Jarrah country. It is apparent
that nature never meant the forest floor to
be ~~denuded~~ bare, & makes provision for
the protection of the surface layers by the growth
of low herbage & large scrub types.
The burning of the leaf litter & scrub
is only a temporary loss & is replaced in a
short time by a fresh growth of scrub & leaves.

(2). Now with regard to the second aspect
namely the manurial benefit derived from
the leaf litter -
In the course of time the leaves rot.
During the process of rotting the bulk of the leaf
is returned to the air under the drying influence of
the sun & only a small percentage is eventually
under the effect of rain
returned to the soil in the shape of mineral salts.
Burning of the litter does not deprive
the soil of its manurial benefit because it
is more or less a hasty form of decomposition
wherein a lot of the large twigs & litter is
made available as plant food in the shape
of a soluble ash.
otherwise remaining insoluble & unavailable as
plant food. for long periods.
Ashes apart from its manurial benefit
conserves the moisture & so offsets the temporary
absence of leaf litter