BARK REDUCTION BY INTENSE FIRES IN THE JARRAH FOREST

by G.B. Peet and J. McCormick

1. Introduction

"Forest Notes" Vol.3 March 1962, contained articles by Mr. Wallace and Mr. Williamson, discussing girth reduction from burnt bark and shrinkage after intense fires in the jarrah forest. Williamson's results from a growth plot in the Dwellingup fire area showed a mean GBHOB decrement of 2.25" of which he attributed 17% to shrinkage.

Recent work supports Williamson's observation and is tendered as further information on this subject.

The results came from a burning treatment applied during November '64 to dendrometer growth plots in a dense jarrah pole stand. The dendrometers are of the band type, fitted on a smoother bark surface at B.H., and the vernier reads to 0.01".

The treatment was a hot Spring burn, achieved by heaping slash around the base of the trees. During the treatment flames reached 20 to 35 feet in height resulting in badly browned but not defoliated crowns. Six plots were treated, each plot containing 5 dendrometer trees.

Observations of GBHOB decrement were obtained from dendrometer readings before and after each burn, and from a reading two weeks after the burns.

The experimental area is located in a regularly controlled burnt compartment which had been burnt 4 years prior to treatment. The bark on the lower bole was well blackened by this previous burn.

2. Results

(a) G.B.H.O.B. decrement due to burnt bark and shrinkage.

Average GBHOB decrement for five trees in each plot is shown on table 1, and the decrement has been divided into that due to burnt bark and that due to subsequent shrinkage. The table also lists stand details which are pertinent to section C of this article.

Table 1. Plot data from dendrometer plots at Coach Rd. Dwellingup Division.

Plot No.	GBHOB decrement (inches)			Number of Trees per Acre	Basal area per acre (sq.ft.)	Average girth of 5 dend. trees (feet)	Average tree girth in the plot
	From burnt bark 26.11.1964	From bark shrinkage 11.12.1964	Total GBHOB decrement (inches)				
5	1.92	0.54	2.46	569	226	2.7	1.9
8	1.68	0.39	2.07	329	176	3.5	2.3
18	1.43	0.27	1.70	458	222	2.9	2.0
21	2.08	0.15	2.23	374	205	3.0	2.3
22	1.85	0.16	2.01	463	165	3.0	1.9
23	1.48	0.25	1.73	396	156	2.5	1.9
$\bar{x}$	1.74	0.29	2.03	192	192	2.9	2.1

The range of GBHOB decrement expressed by the 30 trees was.

Loss due to burnt bark 0.95" to 2.61".
Loss due to shrinkage 0.07" to 0.70".

Table 1 lists a mean GBHOB decrement of 1.74" for burnt bark, 0.29" for shrinkage, and a mean total of 2.03". These results correlate with those given by Williamson for trees with crowns fully browned by the Dwellingup fire, i.e.:

(i). Dwp. fire plot (Williamson) mean total GBHOB decrement 2.17".

(ii). Dendrometer plots mean total GBHOB decrement 2.03".

(iii). Dwp. fire plot percentage of tctal GBHOB decrement attributed to bark sh shrinkage 17%.

(iv). Dendrometer plot percentage of total GBHOB decrement attributed to bark shrinkage 14%.

(b) Amount of dead bark consumed by an intense fire.

The amount of dead bark consumed by the treatment fires is estimated as follows:-

(i). Bark gauge readings before and after burning indicate that 41% of the bark profile was burnt.

(ii). Live and dead bark components in the bark profile were separated, and their respective depths measured. The results indicate that dead bark comprised 43% of the profile before burning.

It is probable that intense fires remove all the dead bark at least from the lower part of the bole. From observations of bark burning and blackening during the treatment, the region of dead bark removal is considered to lie between ground level and 20 feet up the bole.

Comparing bark thickness in a protected stand before and after the Dwellingup fire led to a similar conclusion. The dead bark contributed 52% to the bark profile before burning, and the fire removed 57% of the profile, indicating that all the dead bark is removed from the lower bole in such a fire.

(c). Dead bark as a fuel quantity factor.

An estimation of the quantity of dead bark consumed per acre by an intense fire, in a dense jarrah pole stand, is given from table 1, i.e.:

(i). Loss in BAOB per tree (i.e. bark loss) = 0.0618 sq.ft.

(ii). Loss in volume OB per tree = 0.0618 x 20 = 1.236 cub.ft.

(iii). Loss in volume OB per acre = 1.236 x 433 = 535.2 cub.ft.

(iv). Density of dead bark has been measured at 10369 or 23 lbs./cub.ft.

(v). Weight of dead bark per acre = 5.45 tons e.g. O.D.W.

The dendrometer trees are larger than the stand average and a fuel quantity correction of 0.72 is introduced, to equate bark weight to the average tree.

(vi). Amount of dead bark burnt per acre = 3.9 tons e.g. O.D.W.

It is pertinent to note that a fuel weight of 3.9 tons per acre represents a five-year-old fuel under a 50% canopy. (McArthur 1962). If the bark ignites an entirely different forest fire will develop than if it doesn't, and burning bark was undoubtably a major cause of severe crown damage in recently burnt areas during the Dwellingup fire.

The moisture content of dead bark shows a pronounced seasonal trend, and is much less inflammable in Spring and early Summer than in late Summer and early Autumn.

The amount of ground litter required to support a fire which will ignite and sustain burning bark is probably quite low under severe fire danger conditions. This was well illustrated by the Dwellingup fire where defoliation occurred in all fuel ages over two-years.

A three-year-old ground litter will not support a defoliating fire in high jarrah forest unless additional fuel is introduced, and a major introduced fuel during periods of severe fire danger is undoubtably dead bark. The quantity of this additional fuel is very high, even in regularly burnt stands, and is greater than the accepted maximum ground litter accumulation permitted under the rotational burning system.

The probability of eliminating defoliating fires from the jarrah forest by a four-year burning rotation is slight, but the chances of minimising the area and controlling the head of these fires must of course be quite good.

Ref. McArthur, A.G. 1962. 'Controlled Burning in Eucalypt Forests'. F. & T.B. Leaflet 80.

****