

THE EFFECT OF FIRE ON
PINUS PINASTER PLANTATIONS

SUMMARY

A study of controlled burning at Gnangara with three different fire intensities showed that the amount of litter removed by the burn varied between 5400 and 7000 lb. per acre.

The preliminary evidence indicated that different flame heights did not significantly affect the amount of litter removed by the controlled burn.

INTRODUCTION AND EXPERIMENTAL

Recently, some experimental controlled burning has been carried out in P. pinaster plantations, and in conjunction with this work a burning trial was carried out at Gnangara.

The experiment was laid out as a 4 x 4 Latin Square in compartment 26, North Kendall (P.1951), and the original intention was to select meteorological conditions which would give three sets of flame heights. The selected groups were:-

- (1) - control - no burn
- (2) - flame height 6 - 12"
- (3) - " " 18 - 24"
- (4) - " " 36 - 48"

The experimental design and the original litter values are shown below, Table I.

TABLE I

Experimental Fire Study
Gnangara
Preburn Litter Values.

lb/acre x 10³

1 ^a 17.70 ^{***}	2 ^b 15.93	3 ^c 11.57	4 ^d 9.12
5 ^b 15.79	6 ^a 13.61	7 ^d 10.89	8 ^c 12.93
9 ^c 14.43	10 ^d 22.05	11 ^b 13.88	12 ^a 16.74
13 ^d 19.19	14 ^c 18.78	15 ^a 13.75	16 ^b 14.84

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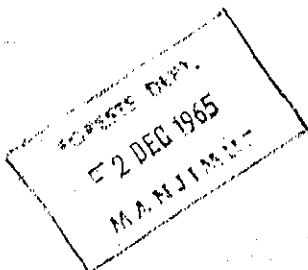
- * Plot No.
- ** Treatment
- *** O.D.W. of Litter (lb/acre x 10³).

The flame heights which constituted the experimental treatments were recorded at five minute intervals during the burn and the mean values were used to differentiate between treatments. The treatments had the following flame heights.

<u>Plot No.</u>	<u>Flame Height (ins)</u>
1A	Control
6A	"
12A	"
15A	"
<hr/>	
2B	20
5B	22
11B	18
16B	20
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3C	7
8C	7
9C	6
14C	6
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4D	41
7D	40
10D	40
13D	43
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The burning was supervised by SFC Ashcroft and Technical Assistants McCormick and Rowell handled the meteorological data and litter collections. To minimise experimental errors plots from identical treatments were lit simultaneously and the area per plot was approximately 4 square chains.

The following meteorological data was recorded during the trial:-



Plot No.	Flame Height (ins)	Surface M.C.	Litter %	Litter M.C.	Profile %	T ₀ F	R.H. %	Wind Velocity MPH.
1A 6A 12A 15A								
Control								
2B 5B 11B 16B	20 22 18 20	18.2 24.2 22.1 19.5		62.5 100.9 74.9 84.6	11.44 8.05	64 " " "	57 " " "	1.8 " " "
3C 8C 9C 14C	7 7 6 6	31.4 36.6 31.3 34.7		124.2 129.3 88.4 92.4		63 " " "	74 " " "	1.5 1.5 1.6 1.6
4D 7D 10D 13D	41 40 40 43	17.2 19.7 21.8 14.5		90.5 81.9 67.6 49.2	20.27 15.52 12.25	66.5 " " "	48 " " "	1.5 1.7 1.9 1.2

RESULTS The postburn litter values are shown below (Table 2)

TABLE 2
Experimental Fire Study
Gnangara
Postburn Litter Values. *16/acre x 10³*

1 17.70 A	2 4.49 B	3 11.57 C	4 9.12 D
5 11.71 B	6 13.61 A	7 10.62 D	8 8.85 C
9 7.21 C	10 6.53 D	11 5.83 B	12 16.74 A
13 6.94 D	14 8.58 C	15 13.75 A	16 10.48 B

The Analysis of Variance of the two sets of data indicated that the burning treatments had caused in marked change in the amount of litter on the forest floor, (Tables 3 & 4, Fig. I)

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TABLE 3
Amount of Forest Floor (Preburn)
Analysis of Variance

S	df.	S S	M S	V.R.	P
Rows	3	42.8286	14.2762	2.84	N.S
Columns	3	74.1285	24.7095	3.19	N.S
Treatments	3	2.4700	0.8233	0.11	N.S
Error	6	46.4523	7.7420		
TOTAL	15	165.8794			

TABLE 4
Amount of Forest Floor (Postburn)
Analysis of Variance

S	df	S S	M S	V.R.	P
Rows	3	10.3598	3.4533	0.53	N.S
Columns	3	21.3422	7.1141	1.09	N.S.
Treatments	3	147.0826	49.0275	7.50	*
Error	6	39.2128	6.5355		
TOTAL	15	217.9974			

The actual mean loss per treatments was as follows:-

Treatment	Flame Height	Amt. of Litter Burnt lb/acre x 10 ³
A	0	0
B	20	6.98
C	6.5	5.38
D	41	7.01

There was no significant difference in the amount of litter burnt under the different flame conditions.

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An interesting way of examining this data is to calculate the percentage litter destroyed by burning, and this data is set out below (Table 5).

TABLE 5
Experimental Fire Study
Ghangara

Percent Litter Destroyed by Fire

1	A	2	B	3	C	4	D
0		72		18		7	
5	B	6	A	7	D	8	C
26		0		3		32	
9	C	10	D	11	B	12	A
50		70		58		0	
13	D	14	C	15	A	16	B
64		54		0		29	

This data was transformed to arcsin values and the Analysis of Variance calculated:-

Table 5
Percentage Litter Destroyed by Burning
Analysis of Variance

S	df	S.S.	M.S.	V.R.	P
Rows	3	878.055	292.685	2.60	N.S.
Columns	3	1101.165	367.055	3.26	N.S.
Treatments	3	4530.570	1510.190	13.39	0.10
Error	6	676.580	112.763		
TOTAL	15	7186.370			

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The mean percentage litter loss was:-

Treatment	Flame Height	Percent litter Destroyed	Arcsin Value
A	0	0	0
B	20	46.2	42.8
C	6.5	38.5	38.0
D	41	36.0	38.8

There was no significant difference in the percentage litter burnt under the different flame conditions.

DISCUSSION

It is evident from the data that a considerable amount of P. pinaster litter is removed by the controlled burn, viz. 5400 to 7000 lbs. However the different fire intensities did not significantly affect the amount of litter removed, and this preliminary data appears to indicate that under the experimental conditions only the surface fuel is removed by the burn. From this very limited evidence it is suggested that the surface fuel moisture content and the relative humidity of the atmosphere were the chief factors influencing flame heights.

after A detailed chemical analysis is to be carried out on litter samples collected before and the ~~the~~ burn, and this will enable quantitative estimates to be made of the nutrients removed by controlled burning.

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