FIRE INTENSITY IN PINUS PINASTER - AN EXERCISE

by

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In the special issue of "Forest Notes" dealing with fire control matters, two tables are to be found on page 46 which give litter and slash fuel weights for P. pinaster. One of the uses to which the tables can be put is in an exercise in estimating possible fire intensity in the event of a wild fire taking place.

Fire intensity is recorded as heat release in British Thermal Units per second per foot of the fire front using Byram's formula in its simplified form - fire intensity equals rate of spread in feet per minute times fuel consumption in tons per acre times six point eight. A typical exercise might be as follows.

A wildfire is progressing through a fourteen year old P. pinaster compartment (which had previously been thinned from 900 to 300 stems per acre) at the rate of seven feet per minute; the ground fuel being in a dry state. The mean butt girth of the thinning tops is 14 inches; the mean fuel depth is 2.5 inches and the total dead wood fuel weight attributed to thinning tops is 5.5 tons per acre. This last figure was arrived at by using van Wagner's line intercept method in a fourteen year old recently thinned P. pinaster compartment in McLarty plantation.

The total available fuel from tables (ex "Forest Notes") and van Wagner's line intercept method would be:-

	Foliage	Twigs ½" thick	Total
600 dead crowns	6 x 1.00	6 x 0.24	7.44
300 green crowns	3 x 1.00	3 x 0.24	3.72
Litter 2.5" deep	9.85	-	9.85
Dead thinning tops (wood over ½" thick)	-	5.5	5.50
			26.51 TPA

Now a fuel consumption figure of 26.51 tons per acre O.D.W. could be considered minimal for this figure does not include bark, extruded resin from standing trees and assumes also that no green wood over half an inch thick would be consumed in such a fire: edge effect fuels and the presence of scrub has also been ignored. The minimum heat output from such a fire progressing at a conservative rate of seven feet per minute would be 1,262 B.T.U's per sec./ft of fire front and if we add a mild five tons of fuel to represent those fuel factors mentioned but not accounted for, the heat ouput would be 1,500 B.T.U's per sec/ft.

This then would be the minimum fire intensity expected in a 14 year old thinned P. pinaster fire once established in dry fuel conditions. The buildup time for such a fire would be in the region of 10 to 30 minutes depending on the weather factor at the time of ignition and in times of dangerous fire hazard, even less. An average flame height of 45 feet with sporadic flaming to 60 feet, i.e. double tree height could well be the result.

A comparison can be made with fire behaviour in controlled burns, e.g. in normal controlled burning operations in P. pinaster a ceiling limit of 60 B.T.U's in unthinned and 100 B.T.U's in thinning tops would rarely be reached and a maximum three foot average flame height with sporadic flaming in tops to 20 feet hardly ever exceeded - in the few cases in which this has happened, severe crown scorch and loss of growth on affected trees has been the result.

It is noted that the amount of fuel available in this particular exercise approximates 1,000 tons O.D.W. per 30 acre block.