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Do Petroleum-Based Protective Coatings add Fuel Value to Slash?

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ABSTRACT: Asphalts and wax emulsions have been recommended as protective coatings to help obtain clean, safe burns in slash disposal work. Fuel value determinations in the laboratory indicate that such coatings add little to the fuel value of slash.

Forest managers know that until the first rains fall in early winter it can be dangerous to get rid of slash by burning. If slash could be protected from moisture by a coating that also is flammable, there would be less of a problem of deciding when to burn.

Asphalt and wax emulsions have been proposed as protective coatings to help obtain clean, safe burns after the first winter rains.[1,2] These emulsions were recommended after qualitative field studies. Their characteristics and effects are now being investigated as part of more basic studies at the Pacific Southwest Station.

Three common speculations as to why protective coatings can aid slash disposal are: (a) Coatings protect slash from moisture; (b) they increase the rate of burning because they are available kindling fuel, or (c) they simply add heat value to slash piles. All three possibilities are now being studied.

This note reports the results of fuel value determinations for petroleum emulsions applied to ponderosa pine (Pinus ponderosa Laws.) slash.

Materials Tested

Two common asphalt emulsions (SS-1 and RS-1), a cutback asphalt primer, and two wax emulsions (soil sealant and lumber wax) were tested. Samples of each emulsion were placed on filter paper and dried until no change in weight could be detected. Their

[1] Kirmire, Nicholas. Report on preliminary tests on water proofing sprays for logging slash. Washington Forest Protection Assoc. April 1963, 4 pp.

[2] McNie, John C. How to dispose of slash better at less cost. Forest Industries 91(9): 33. 1964.

actual combustible composition was computed. The fuel value of two replications of each emulsion was then determined in an adiabatic oxygen bomb calorimeter by using standard methods[3] (table 1). Each pair of samples fell well within accuracy limits recommended by the American Society for Testing and Materials.[4]

In field application of asphalt and wax coatings, 25 gallons of mix are used for each 100 cubic feet of piled slash. The material may be applied with water or solvent in three ratios: 1:1, 1:3, and 1:5 (table 1). From these data it is possible to determine the potential amount of heat added by the coatings.

Table 1.--*Moisture content and actual weight of asphalt and wax coatings*

Coating	Moisture content of concentrated emulsion	B.t.u. per pound	Weight of combustible material in 25 gallons of mix, in ratio of		
			1:1	1:3	1:5
	Percent		*Pounds*		
SS-1	44.5	17,906	6,940	4,625	2,775
Primer	47.7	17,650	6,535	4,355	2,615
Lumber wax	39.0	18,987	7,620	5,080	3,050
Soil sealant	43.4	19,669	7,079	4,720	2,830
RS-1	41.5	17,973	7,310	4,875	2,925

Fuel Value of Slash

To find the total heat energy of the slash, several complete piles of ponderosa pine slash were weighed in the field. Their dry weight averaged 768 pounds. The volume of an average pile was 100 cubic feet.

The fuel value of ponderosa pine in each pile was 8,050 B.t.u./lb. This means the total heat output of a slash pile was 6,182,304 B.t.u. Comparison of this value with the B.t.u.'s of the protective coatings showed that the coatings contributed only 1.2 to 3.4 percent of the heat value of the slash pile (table 2).

This study shows that added heat value alone does not cause an increase in burnability of slash. More likely the coatings protect the slash from moisture and create a highly flammable ignition source. The coatings, which burn even under adverse conditions,

[3] Oxygen bomb calorimeter and combustion methods. Tech. Manual 130, Parr Instrument Co., Moline, Ill. 1960.

[4] Anonymous. Tentative method of test for heat combustion of liquid hydrocarbon fuels by bomb calorimeter. Designation D 240-57T. Amer. Soc. Test Mat., Philadelphia, Pa. 1957.

probably provide enough heat over a large surface area to ignite the slash. Studies now underway on moisture control and burning rates are aimed at providing an even better understanding of the effects of petroleum-based protective coatings on slash.

Table 2.--*Heat value added to slash piles by coatings*

Coating	Heat value in mix of....			Fuel value added to slash pile in mix of....		
	1:1	1:3	1:5	1:1	1:3	1:5
	1,000 B.t.u.			*Percent*		
SS-1	190.0	126.6	75.9	2.9	2.0	1.2
Primer	208.2	138.8	83.3	3.3	2.2	1.3
Lumber wax	206.8	137.8	82.7	3.3	2.2	1.3
Soil sealant	190.0	166.7	76.0	2.0	2.0	1.2
RS-1	216.0	144.0	86.4	3.4	2.3	1.4

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