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Permanent and Semi-Permanent Mulches for Erosion Control on Non-Agricultural Land Slopes

The November-December 1972 issue "Journal of Soil and Water Conservation" includes a report by L. D. Meyer, C. B. Johnson, and G. R. Foster entitled "Stone and Wood Chip Mulches for Erosion Control on Construction Sites." Purpose of this technical note is to abstract information from the report in form of a ready reference for technicians doing erosion control work in California. For more complete information, those interested should read the paper and view the excellent photographic illustrations. This note supplements information on mulches contained in California Agronomy Technical Notes No. 6, 9, 10, 22, 24, 25 and 28.

In reviewing the article or the data abstracted below the reader should keep in mind that the 20-percent slope used for these experiments is gentle compared to critical areas typically needing treatment in California. On steeper slopes there would be increasing tendency for gravity to move the small stone and gravel mulches down slope, thus making them less effective for erosion control. Also, the heavy weight of stone required could increase opportunity for slips, with probability of the added weight causing slips increasing as the slope increases.

The research was carried out on the slope of a burrow pit near Dayton, Ohio. The soil material was 15% gravel, 41% sand, 32% silt and 12% clay.

To check the mulch value of various materials five inches of water was applied to the slope with a rain simulator at an intensity of 2.5 inches per hour.

Mulches used included the following:

1. Cereal straw applied with blower at 2.3 ton per acre. Straw was not tied or tacked, and this probably reduced its soil-holding capacity by 50% or more on the lower slope.

2. Crushed limestone, averaging 0.75 inch diameter at various rates.

3. Washed road gravel with particle size similar to the crushed stone.

4. Woodchips from mixed small hardwoods prepared with chipper one month before spreading.

5. Portland cement sprayed in water solution at two-ton per acre rate.

Data Obtained From Experiment Conducted to Determine Erosion Control Value of Various Mulch Materials

Mulch Type and Rate (T/A)	Average Cover (Percent)	Total Soil Loss (Ave. T/A)	Erosion Rate (T/A/Hr) at Various Distances Down Slope		
			20 ft.	100 ft.	150 ft.
No Mulch	--	39.6	3.0	13.0	30.0
2.3 Straw	95	12.1	1.0	3.9	9.8
15 Stone	16	25.6	2.8	13.0	36.0
60 "	62	11.4	0.7	2.7	8.4
135 "	90	3.5	0.2	0.6	1.0
240 "	100	2.0(-)	trace	trace	trace
375 "	100	2.0(-)	trace	trace	trace
70 Gravel	62	14.7	0.8	4.4	17.0
2 Woodchips	32	27.1	2.3	10.0	25.0
4 "	68	8.5	0.9	3.5	12.0
7 "	88	5.5	0.9	8.2	29.0
12 "	99	--	trace	0.6	--
25 "	100	--	trace	trace	trace
2 Cement	3	32.7	3.0	13.0	29.0

Average velocities of water movement down slope varied from 0.16 to 1.20 feet per second on the upper slope and from 0.18 to 1.62 feet per second on the lower slope. The 25-ton per acre application of woodchips was most effective of all treatments in reducing velocity.

Fall seedings of 30 pounds ryegrass plus 30 pounds fescue per acre fertilized with 400 pounds 15-15-15 per acre was broadcast on all treatments. Adequate stands for erosion control were obtained on straw mulch, 12 T/A woodchips, 135 T/A stone, 240 T/A stone and 70 T/A gravel treatments. Stands on organic mulch treated plots showed nitrogen deficiency symptoms.

Information of greatest practical significance in the paper are the tables showing weights of mulch materials used to give effective erosion control. Ordinarily the conservationist is concerned with recommending the mulch for individual critical areas that will provide the protection needed at lowest cost. As transportation to the site is ordinarily a major cost, information giving some idea of the weight of various materials needed can be of considerable value in selecting the least costly alternati

Of importance also was the information showing how the effectiveness of the light weight mulches broke down on the lower slope. Only the 25-ton per acre application of woodchips and 135 ton and heavier applications of stone gave effective erosion control 150 feet down the 20% slope with five inches of water applied at 2.5 inches per hour.

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