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GRASS SEEDING AS A CONTROL FOR ROADBANK EROSION

by

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Grass, seeded on a steep roadcut in western Oregon, reduced erosion but caused increased surface runoff during a 3-year period of observation. These results were obtained at H. J. Andrews Experimental Forest from a study designed to measure effectiveness of grass in controlling soil erosion from exposed roadbanks. Additional measurements for varying soil types will be needed before conclusions reported here can be considered generally applicable for the Douglas-fir region.

THE STUDY

The study area is located on a road crossing a 21-acre clearcut that was logged in 1952 and burned during the following year. Soils exposed along the roadbanks are an assortment of layered reddish breccias and tuffs. Elevation of the site is 1,875 feet. As is typical of western Oregon's maritime climate, less than 10 percent of the annual precipitation occurs during May to September.

Measurements were obtained from a rectangular plot installed in May 1958 on the roadside cut, which had remained bare since the road was constructed in 1952. Plot boundaries--wood strips driven into the roadbank--enclosed an area on an 80-percent backslope which had a horizontal projection of 18.33 square feet (fig. 1).

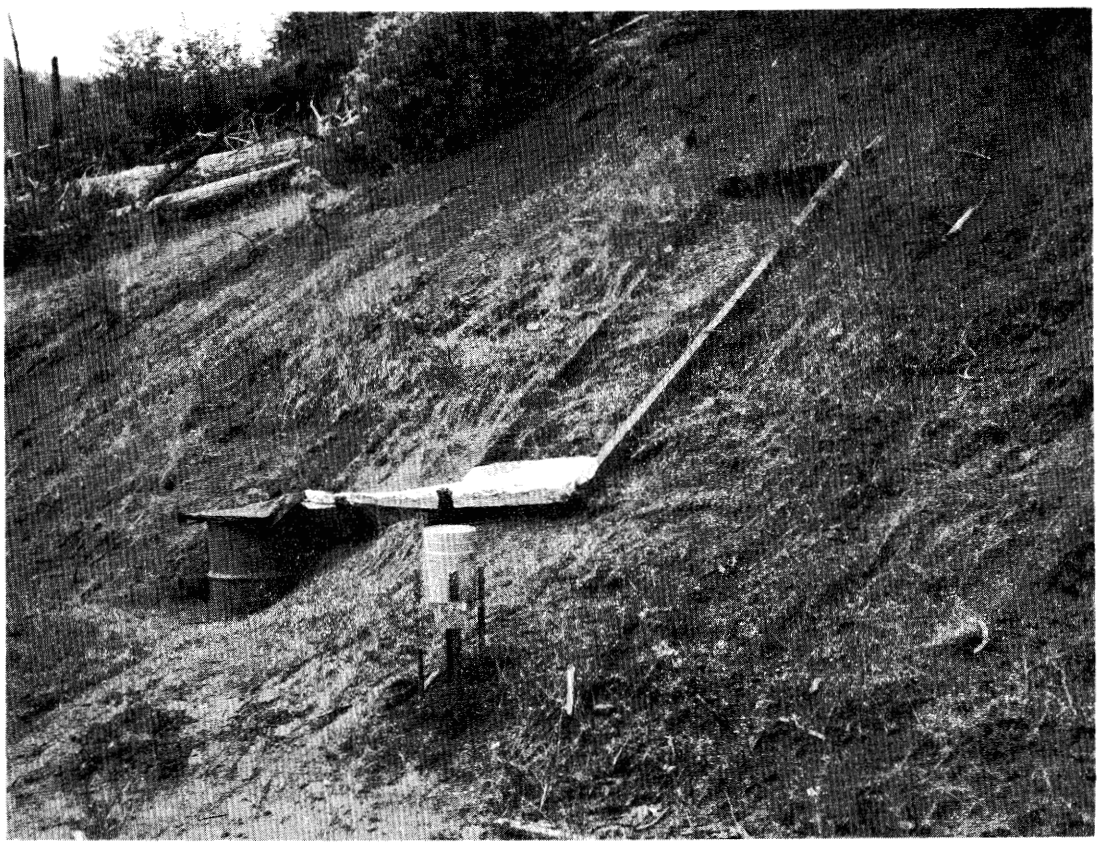

Figure 1.--Condition of study plot at the end of the second season of grass cover. H. J. Andrews Experimental Forest.

To facilitate measurement of surface runoff and sediment accumulation, a channel, lined with aluminum foil, led from the bottom of the plot to a covered collection barrel. Nearby was a 7-1/2-inch rain gage. Following each storm, or shortly thereafter, measurements were made of runoff and precipitation. These measurements began in the fall of 1958 and continued throughout the study. During late summer of 1959 and each year thereafter, accumulated sediment from the previous year was weighed, dried, and its ovendry weight calculated.

In April 1959, after remaining bare for a year, the plot and a buffer area surrounding it were seeded at rates of 6 pounds per acre of perennial ryegrass (Lolium perenne), 8 pounds per acre of meadow fescue (Festuca elatior), and 4 pounds per acre of highland

bent (Agrostis tenuis var. abberant). Included in the mixture was 16-20-0 fertilizer applied at the rate of 160 pounds per acre. The grass did not develop a dense cover until after the rains began in the fall of 1959.

RESULTS

Effects of grass seeding were evaluated by comparing precipitation, runoff, and sediment accumulation before and after treatment. As shown in table 1, precipitation during each of three periods of measurement was similar, ranging from 81.1 to 84.2 inches. Prior to establishment of a dense grass cover, accumulated runoff for 1 year was 6.2 inches, but for the 2 years following grass seeding, accumulated runoff increased to 11.1 inches and 13.6 inches (fig. 2).

Table 1.--Summary of sediment accumulation, runoff, and precipitation

Condition of plot	Period of measurement	Sediment accumulation rate per acre	Runoff (RO)	Precipitation (P)	RO/P
		Tons	Inches	Inches	Percent
Bare	Sept. 1958 to Sept. 1959	12.7	6.2	82.5	7.6
Grassed	Sept. 1959 to Sept. 1960	4.2	11.1	84.2	13.2
Grassed	Sept. 1960 to Aug. 1961	2.3	13.6	81.1	16.7

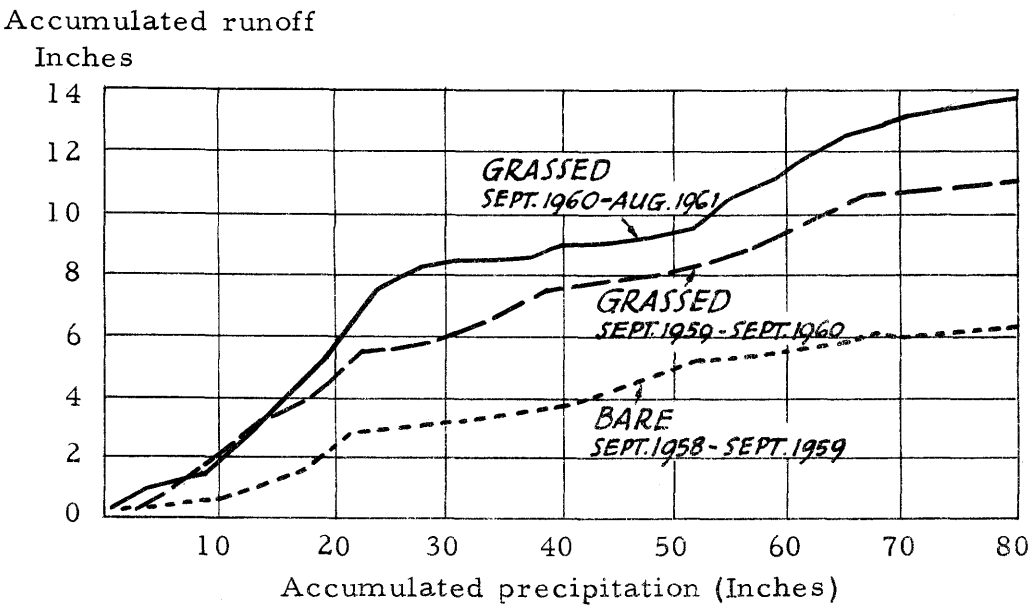

Figure 2.--Accumulated runoff and precipitation from road-bank erosion plot for three seasons. H. J. Andrews Experimental Forest.

Following grass establishment, there was a reduction in the amount of accumulated sediment (table 1). The bare period produced the greatest amount of sediment, an equivalent of 12.7 tons per acre. In the 2 years after treatment, this figure was reduced to 4.2 and 2.3 tons per acre, respectively.

At the end of each growing season, grass on the plot had formed a thick, protective mat which remained until growth resumed the following spring (fig. 1).

DISCUSSION

Results of this preliminary study have shown an increase in runoff and a decrease in erosion after grass seeding. Observed increases in runoff are contrary to experience of other investigators who have found that grass seeding tends to increase infiltration and reduce runoff. Our conflicting measurements may result from an interception effect of grass cover. During the nongrowing season (when 90 percent of the rain fell), the grass tended to mat. While in this condition, it may have shed water like a thatched roof, thus

increasing runoff from the short plot with its uniformly steep slope, typical of most roadbanks.

Reduced sediment can be explained by the same phenomenon. Water running over and through the matted grass was not in contact with the soil. Also, by cushioning raindrop impact, grass affords additional protection to soil, resulting in less surface erosion.

Need for control of erosion from roadbanks is certainly real. As an example, the road on which our study was located disturbed some 3.6 acres in the 21-acre clearcut it traversed. Other data from H. J. Andrews Experimental Forest indicates that backslopes account for about 29 percent of the area disturbed by roads. On this basis, the road in question had a capacity to produce 13 tons of sediment annually, whereas if roadbanks were controlled by a good grass cover, annual potential loss of sediment could be reduced to 2.4 tons.