Soil Losses as Affected by Cover, Rainfall, and Slope

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Runoff and erosion losses are dependent upon many interrelated factors which, under field conditions, are not easily separated. Many of these factors have been studied individually and in various combinations. Since the measurement of soil and water losses is an expensive procedure, basic information is still lacking on the effect of many variables and factors on soil movement and runoff. Most farm conservation plans should be reviewed and replanned as more facts become available.

Soils upon which the study was conducted are located in Pope County, Ill., and are in the lower Mississippi loess area which comprises 10 to 12 million acres of land in Illinois, Indiana, Kentucky, Tennessee, Arkansas, and Missouri. The region is unglaciated, badly eroded, and low in productivity. The topography of the area varies in steepness, with a considerable portion consisting of slopes from 5 to 9%. The probable United States correlation for the soil type used is the Grenada catena.

This paper is a report of soil losses from various lengths of plots on both 5 and 9% slopes. The study was conducted for 7 years during the period 1939-1946. The effect of various crops, rainfall, and slope characteristics on soil losses is discussed briefly.

PROCEDURE

Plots were located on approximately 5 and 9% slopes. Four lengths of plots were established: 35, 70, 140, and 210 feet. The plots 35 feet in length were replicated four times. All other length plots were established in duplicate. The plots were located on four sites at the Dixon Springs Experiment Station. The plots on 9% slopes were duplicated approximately 1 1/2 miles apart. Recording raingages were located on each experimental site to measure rainfall amounts and intensities.

Soil and water losses were measured by use of multislot divisor units in combination with a silt box and storage tanks.

Soil treatment on the plots consisted of 3 to 4 tons of limestone, according to test, and 300 pounds of 32% superphosphate. These treatments were applied in the fall, in one replicate and in the spring of 1937 on the other. The plots were then seeded to a grass-legume mixture. Starting in the spring of 1939 with corn on all plots, a 3-year rotation of corn, winter wheat (lespedeza), lespedeza was established. All seeding and tillage operations were performed on the contour. Seedbed for corn was prepared by plowing and harrowing. Plots were disked and wheat drilled after removal of corn crop. On three seeding dates approximately 2 weeks apart, lespedeza was seeded in the wheat in January, March, and early April. Corn was removed as fodder, wheat and lespedeza were grazed by sheep and clipped to control weeds. An application of 150 pounds of 20% superphosphate per acre was made once during each 3-year period, at wheat seeding time.

RESULTS

Soil losses from each individual plot and average soil losses from replicates and quadruplicates in tons per acre during the production of three corn, three wheat, and four lespedeza crops are shown in Table 1. Frequently, large differences in soil loss occurred between replicates and between quadruplicates. Many uncontrolled factors have contributed to these variations in cropping and management of the land on the plots.