FIELD METHOD FOR EVALUATING EFFECTS OF PHYSICAL FACTORS AND FARM MANAGEMENT PRACTICES ON SOIL EROSION AND CROP YIELDS

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TECHNICS applicable for evaluating the effects of physical factors, such as length and degree of slope, along with the effectiveness of soil conservation practices, have long been needed. It is obvious that in evaluating the effectiveness and practical application of farm management practices for a field or a farm, consideration must be given to crop yields and determination made as to whether the land is being used wisely, and if the permanency of the soil can be assured.

Experimental data from our soil conservation experiment stations supported by survey data from large acreages of land throughout the United States, show that erosion becomes more serious as the length of slope increases and that the steeper slopes lose proportionately more soil by erosion than do the more gentle slopes. It has been further observed on these stations and also on farms in every section, that crop yields on badly eroded fields and farms have declined sharply. General observations have shown that crops produced on slopes where the surface soil has been almost completely removed by erosion, are inferior as to both quality and quantity. Wide differences in the amount of erosion that has occurred on fields that have been managed differently can be noted in every community. It is desirable, therefore, to learn first how much soil has actually been removed from fields representing different slope classes with respect to degree and length, and also how these losses have been affected by the way the land has been used since it was first brought under cultivation. In the second place, it is equally desirable to determine what effect this soil removal by erosion on different soil types, has had on the productivity of the land. If, for instance, it is found that different degrees of erosion as represented by various depths of surface soil are portrayed by different crop yields, then it is necessary only to evaluate a practice or program in terms of time to erode an inch of surface soil in order to be able to predict the degree of permanency of the soil and the rate of modification of crop yields.

BASIS FOR AND DESCRIPTION OF FIELD SURVEY METHOD

Soil erosion is known to alter markedly the depth of topsoil by removing the surface soil from steeper slopes, depositing some of it on the more level areas and actually moving varying portions of it off the field and farm. As is pointed out recently by Bennett (1), the effect of length of slope is complicated by some soils by a little understood process of loading and unloading on the part of thick and thin sheets of soil transporting water flowing across the field. While rains of high intensity appear to remove more soil per unit area from the longer slopes on which measurements have been made, the trend is reversed in respect to the effect of precipitation of less intensity so that for certain soils, the annual losses have differed but slightly for the varying slope plots. It has been observed that under field conditions, deposition in the form of miniature benching frequently occurs at various locations on slopes, particularly where the steepness of slope lessens. Increased erosion may, in turn, take place with a sudden increase in the steepness of slope, regardless of its position on the slope.

In order to secure needed information for supplementing the data available for only relatively narrow and short plots, a field study was developed and has been initiated for assembling quantitative information on sizable areas on which cropping and management histories are available. To date, cooperative studies with the State agricultural experiment stations have been initiated on the Soil Conservation Service demonstration areas at Fowler, Ind.; Bethany, Mo.; and Shenandoah, Iowa. Data will be secured on the effects of factors, such as length and degree of slope, varying cultural and cropping practices as reflected by the present depth of surface soil. The depths for slopes representing given steepnesses and lengths...