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THE ORGANIC MATTER CONTENT AND MOISTURE RELATIONS OF SOME CROPPED AND VIRGIN SOILS

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A large number of Oklahoma soils have been analyzed for their organic matter content. The analyses reported in this paper are of 206 paired samples where a virgin soil is accompanied by a sample of the same soil after some years of cultivation. The virgin soil samples were taken from a pasture, meadow, or timbered area which had never been under cultivation while the cropped soil samples were taken nearby. In no case did a great distance separate the virgin soil from the respective cropped soil. In all cases samples were taken only when it was decided that the comparisons would be accurate. In some instances the samples doubtless were not strictly typical, but on the whole, it is thought that they are representative. The modified Schollenberger[3] method was used in determining the organic matter content. Although the data for the southeastern section of the State are rather meager on paired samples (Table I), other data not presented would substantiate the general low organic matter content of the cropped soils here as well as in other sections of the State.

TABLE I. *Percentage of Organic Matter Content of Oklahoma Soils by Sections.*

Section	Virgin Soils	Cropped Soils	Loss
Northeast	3.28	2.39	27.1
Southeast	3.06	1.98	35.3
Northwest	2.72	1.89	30.5
Southwest	2.51	2.06	17.9
State Average	2.91	2.13	26.8

MOISTURE RELATIONS

The slope of the land and the texture and structure of the soil profile are important factors in this connection. With a very fine texture the individual pore spaces will not allow rapid movement of water downward; hence, with heavy rains, considerable runoff and erosion occur. Where the structural conditions of the surface soil are such as to allow water to enter and there are no impervious horizons in the profille, less runoff and erosion occur. Organic matter tends to produce a suitable surface structure for water entrance. Soils well supplied with organic matter allow water to enter the profile and if the soil is deep, erosion is limited. Water penetrates a soil well-supplied with organic matter, but is lost in runoff by the same soil when it has lost its organic matter. Not

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only does organic matter have a favorable influence on the entrance of water into Oklahoma soils, but it increases the absorptive capacity as well. The sticky point which Keen[2] regards as indicating the amount of moisture in a soil when the attractive force for water is exactly satisfied, was determined on 304 paired samples which included 206 paired samples for which organic matter determinations were made. Any water in the soil above the sticky point causes the soil to work into a more or less puddled condition when tilled; hence, this determination gives the moisture content at a maximum for tillage for loams and heavier soils. As an average, the results show that the virgin soils would retain 22.64 per cent of moisture while the respective cropped soil would retain 19.77 per cent, or a difference of 2.87 per cent, which represents water available for plant use. Most of the cultivated soils in the state are very fine sandy loam or heavier in texture. Wilting point determinations[1] on these soils show 8 per cent or more moisture in the soil when permanent wilting occurs. For sandier soils, the wilting coefficient is lower. Vernon fine sandy loam has a wilting point of about 6 per cent. Any moisture in the soil at wilting point or less is of no value for growth and if 8 per cent is taken as the average wilting point for these soils, the cropped soils retained only 80 per cent as much available water when their attractive forces for water were satisfied as did the virgin soils. When the same amount of water was added to the cropped soils as it took to satisfy the attractive forces of the respective virgin soils, the cropped soils became very muddy. In some instances they were so wet that they would not retain any rigidity at all but had a tendency to flow. Before such a soil could be cultivated it would have to lose this extra water largely by evaporation. This is a very important item when it is realized that moisture more than any other one factor controls crop production in this state.

LITERATURE CITED

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2. Keen, Bernard A., The Physical Properties of the Soil (Longmans, Green, 1931).

3. Schollenberger, C. J., Determination of soil organic matter, Soil Sci. 31; 483-486 (1931).