SOIL AS A FACTOR IN THE FUTURE OF GREAT PLAINS AGRICULTURE

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The Great Plains Region is an area where farmers gamble on the weather. Many individuals interested in quick wealth without regard for the future welfare of the country flocked to the region to take advantage of high crop production during periods of favorable rainfall. During periods of below-average rainfall, unwise agricultural ventures resulted in disaster to those who depended entirely upon cash crop farming in a region better adapted to the production of forage crops. Abundant production during favorable seasons and high agricultural prices have encouraged the western extension of cultivated areas. Because of a relatively uniform topography, climatic changes are very gradual. There is no physical barrier serving as a silent sentinel to show where declining rainfall becomes a serious limiting factor in the production of cultivated crops. Much of the land has been classified as semi-productive since the climatic elements do not occur in the best combination to favor intensive cultivation. The ability of the soil to supply an adequate quantity of plant nutrients for crop production exceeds the climatic possibilities under average conditions. The agriculture of this area is not old enough to have encountered many soil fertility problems. The majority of the problems have been and will continue to be physical in nature. Systems of farming not adapted to the region have been important factors in the failures that have occurred.

The boundary of the Great Plains area is not precisely defined, but it includes approximately 600 million acres of land, about 175 million in Canada, 420 million in the United States, and 5 million in Mexico. Chilcott (7) proposes the 5,000-foot contour on the east side of the Rocky Mountains as the western boundary and the 98th Meridian as the eastern boundary. Marbut (21) proposes a line separating the pedocal and pedalf er soils as the eastern boundary. He has classified the soils of this region into four groups, depending upon surface color. They are (a) black soils, (b) very dark brown soils, (c) dark brown soils, and (d) brown soils. A zone of lime accumulation occurs in all mature soil profiles, being nearer the surface in northern and western part of the area.

According to Baker (1), land which is worth $25 per acre for wheat is normally worth only $5 to $10 per acre for grazing cattle, and $4 to $8 per acre for grazing sheep. It is not difficult to understand why large areas of grassland were put into cultivation and why it is not easy to convince a farmer that he should plant grass on cultivated land, even though it should be shown not to cost them extra time or labor in doing so. Crop production can be increased on a high percentage of the soils in the Great Plains with more efficient use of rainfall. Depth of soil, structure, and slope are important factors in the value and use of water conservation methods.

Mechanical procedures which increase the effective utilization of rain were first studied at Dalhart, Texas, and at Spur, Tex. Dickson (10) has shown that terracing and contour farming increased the average yield of lint cotton 150 pounds per acre. In a recent publication, Finnell (11) reports that similar conservation methods increased the average yield of wheat 2.99 bushels per acre.

A personal letter from H. F. Rhoades of Nebraska emphasizes the fact that moisture is the important single factor in crop production, but variation causes differences in moisture utilization just as it affects the use of fertilizer in the region.

The most favorable soils for water conservation in the Great Plains are those based on loess, or less in the western part of the area to 22 inches in eastern North Dakota and 30 inches in central Kansas and Texas. Although 15 to 20 inches of water is needed for successful farming, seasonal variation of evaporation, and distribution affect production. Seventy to 80% of the annual precipitation falls between April and September. Although rainfall is lower in the northern part of the Great Plains area, it is more dependable than in the southern part of the region where more of the precipitation occurs as torrential rains. Twice as much evaporation occurs in the southern part as in the northern part of this area. Shantz (28) reports that 1,000 tons of water were required to produce 1 ton of alfalfa at Dalhart, Texas, whereas 518 tons of water were required to produce a similar yield at Williston, N. D.

Baker (1) has divided the Great Plains region into four moisture belts, viz., (a) the sub-humid farming belt, (b) the semi-arid farming belt with crops dominant, (c) the more arid forage crop belt, and (d) disconnected arid rough areas suitable for grazing. Cropping and practices which will increase or maintain production are primary problems in the black earth belt. In the three other areas, lack of water prevents the use of intensive methods.