

EFFECTS OF LONG-TIME FERTILITY TREATMENTS  
ON SELECTED CHEMICAL PROPERTIES  
OF A MOLLISOL

by

ELMER DEAN GRAUERHOLZ <sup>4871</sup>

B. S., Kansas State University, 1968

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A MASTER'S THESIS

submitted in partial fulfillment of the  
requirements for the degree


MASTER OF SCIENCE

Department of Agronomy

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

1970

Approved by:

  
Major Professor

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1970  
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## INTRODUCTION

The farm land in Kansas has been cultivated for a shorter period of time than land in states to the east, and Kansas soils are, on the whole, comparatively productive. The productivity of these soils, however, has been reduced greatly because of improper cropping systems and inadequate management which have permitted nutrient loss, structural deterioration, and erosion.

High productivity of a soil implies that high yields can be obtained in relation to the labor required or to the cost of production. Some soils differ in their productivity from one crop to another, and may require different management practices for different crops. The management practices may include tillage operations, application of fertilizers and/or lime, provision of satisfactory erosion-control techniques, drainage and irrigation. Thus, management can influence soil productivity. In most cases good soil management can counteract low soil productivity.

Soil fertility is included in the concept of soil productivity, but refers only to the content, balance, and availability of the chemical compounds in the soil that are necessary for plant growth.

Climate, soil depth, soil acidity, nutrient content, slope, texture and susceptibility to erosion are some of the characteristics that influence soil fertility. Since soil is

the result of the action of the environment on soil material, each soil property, including soil fertility, is changed slowly under natural conditions until it is in equilibrium with the forces that destroy or deplete and those that build or renew. Under natural conditions the equilibrium state is usually satisfactory for the growth of some types of plants. Under the artificial conditions imposed by cultivation, however, it often happens that soil conditions are not satisfactory for the production of optimum, or at least economical, crop yields. Often soil management practices are developed and used in these instances to increase the possibility of high-level crop production.

The Soil Fertility Project, started in 1909 by L. E. Call on the Agronomy Farm, Kansas State University, Manhattan, Kansas, has been a site for conducting investigations on the effect of crop rotations and fertilizer practices upon crop yields and upon the nitrogen and organic-carbon content of the soil. The material presented in this thesis is but one of a series on these investigations. It will present information on the effect of management upon the available phosphorus, nitrogen, and organic carbon content of the soil.

This project was located on the SE 4.8 acres of the NW 1/4 of the SE 1/4 and the SW 6 acres of the NE 1/4 of the SE 1/4 of S 1 T 10S R 7E. The area on which this experiment was located has been under cultivation since 1864. During the time from 1864 until this experiment was started in 1909, the land