IN connection with a study of the effect of acidity upon the cotton root-rot fungus, conducted in cooperation with Dr. J. J. Taubenhaus of the Division of Plant Pathology and Physiology of the Texas Agricultural Experiment Station, large quantities of several types of Texas soils were made acid either by sulfuric acid or by the oxidation of sulfur added to the soil. The acidity of the soils, under field conditions, decreased in the course of time and almost disappeared after a few years. This decrease in acidity may have been partly due to the downward movement of acid caused by rain and partly due to the production of basic substances by the action of the acid or of weathering agencies upon the soil. The rate and extent of downward movement of soil acidity is of significance in connection with studies of the acidification of the soil in an attempt to control cotton root-rot. In order to ascertain the cause and extent of this decrease in acidity, and of the downward movement of soil acidity, the detailed experiments here reported were made.

EXPERIMENTAL

The surface soil of a Lufkin fine sandy loam was placed in 18 glazed tiles about 18 inches in diameter and 24 inches in depth, sunk in the ground to a depth of 19 inches. The buffer capacity of the soil was first determined by the method of Fraps and Fudge. Sulfuric acid or sulfur were added to the top 5 inches of the soil in various multiples of the buffer capacity. Three tiles were used for each application.

Sulfuric acid sufficient to change the pH from 6.7, the pH of the untreated soil, to pH 4.5 (640 p.p.m. of sulfur) was added to the three tiles of series 1. Series 2 received 1.75 times this amount. In the sulfur applications, an allowance of 0.3 pH (to pH 4.2) was made for incomplete oxidation. Sulfur required for series 3, 4, 5, and 6, respectively. The additions were thoroughly mixed with the 70 pounds of soil in the top 5 inches on April 2, 1930. At various intervals during 5 years samples were taken with a fertilizer sampler. The top layer was sampled to a depth of 5 inches, but the other layers sampled were 1 inch. Each boring was made according to a diagram and was far enough from previous borings to prevent errors due to mixing or washing of the top soil through the hole into the lower layers. The pH was determined with the use of a quinhydrone electrode. The results, average of three cylinders, are presented in Table 1.

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2 Chief of Division and Associate Chemist, respectively.