THE CORRELATION OF THE pH VALUES OF SOIL PROFILES WITH THE GREAT SOIL GROUPS

by

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Introduction

During the last ten years an increasing amount of attention has been paid by soil survey workers to the correlation of the soil pH profile curve to soil type both by colorimetric determinations in the field and by careful electrometric determinations in the laboratory with the hydrogen electrode. At the 1926 meeting of the American Soil Survey Association, Bushnell of the Indiana Soil Survey, read a paper giving the pH profile of the Gibson silt loam, and Conrey of the Ohio Soil Survey gave the reaction profile of the Clermont silt loam. Likewise, at this same meeting, Baldwin of the United States Soil Survey, gave the hydrogen-ion concentration profile of the Miami silt loam. In 1929, Norton and Bray of Illinois put out a publication on "The soil reaction profile", in which they gave the profile reactions of 14 of the most important soil types of Illinois. At the 1930 meeting of the American Soil Survey Association, Goodman of the United States Soil Survey gave the pH profiles of the Volusia and the Lackawanna silt loams.

Experimental

For this paper two or three series from each of the more important soil groups in this country were selected from the numerous soil types upon which determinations had been made with the hydrogen electrode. Each soil series consists of 1 to 3 types of similar texture. They are as follows:

I. Lateritic Group (Table 1.)

Subgroup 1 includes soils with parent material derived from soft limestone. The Greenville series was selected as representative of this subgroup. The classes studied consisted of sandy loams, fine sandy loams and clay loams, a total of 10 profiles from the southern coastal plain in North Carolina, Georgia and Alabama. The upper profile in Table 1 is a typical Greenville profile. The profile hydrogen-ion concentration of this series ranged from pH 4.6 to 6.8. Six out of the ten profiles became increasingly more acid with depth, the leached C horizon being the most acid. The other 4 profiles showed the C horizon to be less acid than the B horizon.

In Subgroup 2, the parent material is residuum from granite and gneiss. As representative, 11 profiles of Cecil sandy loams and fine sandy loams were studied. These were from the southern piedmont in North Carolina, South Carolina, Georgia and Alabama. The lower profile in Table 1 is a typical Cecil profile. The hydrogen-ion concentration of these profiles ranged from pH 4.4 to 6.0. Five of them, like some of the Greenville profiles, had the C horizon slightly less acid than the B horizon.

II. Podzol Group (Table 2)

In subgroup 1, the parent material is residuum from the Late Wisconsin Drift. Two representative series consisting of fine sandy loams and clay loams from northern Michigan were studied. The upper profile in Table 2 is a typical Onaway profile. The hydrogen-ion concentration of these profiles ranged from pH 3.6 to 5.1.

In subgroup 2, the parent material consisted of noncalcareous till from schist, granite and gneiss. As representative, 11 profiles of the Berkshire loam, a total of 10 profiles from Massachusetts and Vermont. The lower profile in Table 2 is a typical Berkshire profile. The hydrogen-ion concentration of these profiles ranged from pH 4.4 to 8.6.

In subgroup 2, the parent material consisted of noncalcareous till from schist, granite and gneiss. As representative, 11 profiles of the Berkshire loam, a total of 10 profiles from Massachusetts and Vermont. The lower profile in Table 2 is a typical Berkshire profile. The hydrogen-ion concentration of these profiles ranged from pH 4.4 to 8.6.