AVAILABILITY TO CORN OF NUTRIENTS IN THE A₂ AND B HORIZONS OF HILLSDALE LOAM

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The ability of corn, oats, barley, and potatoes to utilize soluble nutrients occurring in the lower soil horizons was shown by Weaver, Jean, and Crist (1). Millar (2) showed that while corn can absorb soluble nutrients placed in the lower horizons, under the conditions of his experiments insufficient quantities of nutrients were obtained from unfertilized soil of the A₂ and B horizons of Coloma sand and Leslie (now named Hillsdale) sandy loam to make possible any considerable growth. The addition of NH₄NO₃ increased growth to a slight extent in the B horizon and more appreciably in the A₂ horizon. That crops vary in their ability to grow in different horizons of various soil profiles was shown by Millar (3). The question arises as to whether the failure of a given crop to grow satisfactorily in material from a lower horizon of a certain soil profile is due to a lack of available nutrients or to some other condition, as soil reaction, the presence of a toxic substance, or an undesirable physical condition.

EXPERIMENTAL

To determine to what extent the addition of soluble nutrients will overcome the non-productiveness of the A₂ and B horizons of Hillsdale sandy loam for corn, glazed tile 10 inches in diameter and 24 inches long, set with the upper edge slightly above the surface of the soil, were filled with soil from the different horizons as indicated in Table 1 and planted to corn. The experiment was started in June, 1924, and no other additions were made to the soil that year except to that in nine of the tiles where 0.528 gram of NH₄NO₃ was added to each. The results for 1924 were reported previously (2) and were referred to briefly earlier in this paper.

On May 17, 1925, about ¼ inch of soil from the surface of each tile was scraped off in order to remove any foreign material which might influence the plant growth. The soil to a depth of 4 inches was then removed, pulverized, the roots removed, and the soil replaced, after fertilizers as shown in Table 1 had been added to the soil in the tiles. The fertilizer was in solution and was prepared from C. P. H₃PO₄, NaNO₃, and K₂SO₄. The rates of application were equivalent to 500 pounds per acre of 16% superphosphate, 300 pounds per acre of NaNO₃, and 200 pounds per acre of sulfate of potash. Calculations were based on the area of the soil surface in the tile. Corn was planted at once and thinned to two plants per tile when a few inches high. On September 26 the corn was cut, taken to the laboratory, and weighed when it became thoroughly room dry.

Due to the dryness of the season the growth was limited in all