The Effect of Air Drying on the Hydrogen-ion Concentration of the Soils of the United States and Canada.

By

Ernest H. Bailey

Bureau of Chemistry and Soils

Results of other investigators

In the last few years several soil investigators have reported that the reaction of soil samples changed more or less on passing from the moist field condition to the air dry state. Some have gone so far as to say that no hydrogen-ion determinations are reliable unless made on fresh moist samples. However, most of the determinations which have been reported are made on air dry soils as they are much more convenient for use than fresh moist samples.

Healy and Karraker, at the Kentucky Experiment Station, Burgess from the Rhode Island Experiment Station and Rost and Fieger at the University of Minnesota, all worked with the hydrogen electrode and found a general tendency for the reaction of soils to increase in acidity on air drying. Rost and Fieger got the most variable results. Twenty-six out of the 40 samples examined changed more than 0.10 pH units on drying out. The changes in these samples ranged from 1.15 pH units more acid to 0.49 pH units less acid.

Baver from the Ohio Experiment Station used the quinhydrone electrode in the study of cultivated soils. He found that with the surface layers only those from the limed plots changed in reaction more than 0.10 pH units on becoming air dry. They increased in acidity from 0.12 to 0.32 pH units. On four limed plots he found the acidity to increase on air drying in every case with depth. The differences in reaction between the moist and the air dry samples varied as much as 0.63 pH units in the case of the deepest layer of one of the limed plots. Biilmann and Jensen in Denmark worked with the quinhydrone electrode on 19 Danish soils and found that 7 of them changed in reaction more than 0.10 pH units on drying. These changes ranged from 0.11 pH units to 0.20 pH units more acid. But the most spectacular results have been obtained by Aarnio of Finland. He also used the quinhydrone electrode and worked on 14 Finnish clay samples. Nine