THE EFFECT OF DILUTION ON THE SOLUBILITY OF SOIL PHOSPHORUS

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SINCE the water-soluble phosphorus in most humid soils is small, studies dealing with specific influences of dilution on the behavior of soil phosphorus are limited; yet a number of papers have suggested a possible influence of dilution on the solubility of phosphorus. Hibbard (2) reports that the amount of PO₄ dissolved increases as the volume of solvent is increased up to a high dilution when dilute hydrochloric acid is used as a solvent, but that the concentration remains almost constant where water is used as the solvent, even with a dilution of 100 or more parts of water to 1 of soil. Lohse and Ruhnke (3) report a higher concentration of phosphorus with a 1 to 20 dilution (using a 0.01 M KHSO₄ solvent) than a dilution of 1 to 4 or 1 to 50. On the other hand, leaching a garden soil with a solution of KHSO₄ having a pH of 2 gave the greatest concentration of phosphorus in the first leaching. Bryan (1) reported that the phosphorus concentration of the successive leachates of different soils increased for a time, but a maximum concentration was not reported.

Soluble aluminum, calcium, and iron, as well as other elements, are known to decrease the concentration of phosphorus in the soil solution. In most cases these agents are more abundant than phosphorus and thus render phosphates insoluble. But in sandy soils with less quantities of fixing agents the conditions are different.

That calcium in the soil decreases the solubility of phosphorus is confirmed by the work of McGeorge (4) and others. McGeorge (4) reports that crops respond to phosphate fertilizers on calcareous soils even though they contain a high content of phosphates. Moreover, leaching such soils usually decreases the response of phosphate fertilizers.

In successive leachates of a soil Parker and Tidmore (5) found an increase in phosphorus and a decrease in calcium. Teakle (6) found that additions of ammonium oxalate to the soil solution greatly increased the phosphorus concentration.

The object of this study was to determine the effect of dilution (with water) on the solubility of phosphorus in sandy soils.

EXPERIMENTAL METHODS

The study was conducted under laboratory conditions, using a number of soils varying in texture and known to have a wide range in water-soluble phosphorus. The study consisted primarily in diluting the soils with varying amounts of distilled water and determining the phosphorus in the filtered solutions. The di-