4. SOME EFFECTS OF FERTILIZERS ON THE NATURE OF THE SOIL SOLUTION WITH SPECIAL REFERENCE TO PHOSPHORUS

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The rate and degree of solubility of a solute in a solvent, or of simple mixtures of solutes and solvents, can be determined quite accurately in most cases; but in the case of soils, the difficulties encountered in removing the solution unaltered from the soil mass greatly interferes with the accuracy of solubility determinations, especially when small quantities of substances are to be determined.

Most of the soil studies conducted along this line have been made relative to some empirical method, or deductions have been made by analogy to better known conditions. In soils we find not only a relatively large number of substances dissolving in the soil solution, but the situation is still further complicated by the fact that these several soil substances are combined together in variable systems—both the substance and the system affecting solubility relationships. We are handicapped by the lack of suitable methods for studying the composition of the soil water as it surrounds the soil particles, and which acts as a source of supply of nutrient elements.

The quantity of a nutrient element in solution in the soil water at any one time is the resultant of the several contributing factors, whatever they may be. Some of these factors are known, and it is probable that some are unknown. That the same factors do not influence all the nutrient elements alike can be deducted from the known properties of these elements and these compounds; and because of the dynamic nature of soils, we know that the factors themselves which influence soil solution are constantly changing. The situation, then, with respect to the solubility of a nutrient element applied to the soil in the form of fertilizer, is complex, being influenced by many changing factors.

Some studies have been made on the solubility of phosphorus in soils by means of a simple field test before and after the addition of phosphorus fertilizers. This work is, primarily, an attempt to determine just what can be accomplished in the field by means of a

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