The Phosphorus Status of Some Azonal, Prairie, and Chernozem Soils in Eastern Nebraska

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Phosphorus is second in importance of the plant nutrient elements found to be deficient in Nebraska soils. Many crops grown on acid or alkaline Nebraska soils respond to applications of phosphate fertilizers. Nevertheless, blanket recommendations for the use of phosphate cannot be made in view of the fact that many of the soils supply sufficient phosphorus for plant growth, while with other soils, only certain crops respond in yield to applications of phosphate fertilizers.

Investigations on the various aspects of the phosphorus problem have included determinations of the phosphorus status and related properties of Nebraska soils. The procedures for fractionating the soil phosphorus, though somewhat empirical, merit being used until more direct methods are available to the soil chemist. The procedures used in the investigation of the nature of the phosphorus in the profiles of some eastern Nebraska soils have been used by other investigators in this laboratory. These fractionation techniques were based on the solubility of the soil phosphorus in different reagents (3, 13).

LITERATURE REVIEW

The solubility of soil phosphorus in various reagents has been investigated by other workers (3, 6, 15, 16). Teakle (14) studied the effect of reaction and cation concentration on the solubility curves of soil phosphorus at different pH values to characterize the phosphorus in the C horizons of some Nebraska soils. Iron and aluminum phosphates were soluble at low pH values. The calcium phosphates were very soluble at pH 3.0, but had low solubilities in alkaline solutions. The profile of the Marshall soil investigated was found to contain at least two forms of phosphorus.

The profile distribution of total or acid soluble phosphorus has been reported by Glentworth (4), Alway and Romine and Metzger (10), and others (5, 7, 8, 9). Pearson, Spry, and Pierre (8) found that the acid soluble phosphorus content of the soils investigated was often lower in the C horizons than in the low A and upper B horizons. The profile distribution of soluble phosphorus in the profile of Keith, Dawes, Holdrege, Hastings, Crete, Butler, and Scott soils has been reported by Glentworth (4), Alway and Rhoades (3, 13), and others (5, 7, 8, 9). Pearson, Spry, and Pierre (8) found that the acid soluble phosphorus content of the soils investigated was often higher in the C horizons than in the low A and upper B horizons.

The data of the five profiles presented in this paper were selected from a group of 13 profiles which had been sampled.