Availability of Phosphorus in Rock Phosphate as Influenced by Potassium and Nitrogen Salts, Lime, and Organic Matter

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The objective of this study was to determine the influence of adding potassium and nitrogen salts, lime, and organic matter to rock phosphate on the availability of phosphorus in rock phosphate. Both the yield and chemical composition of rye were used as methods of evaluation.

Phosphorus in rock phosphate (fluorapatite, $3\text{Ca}_3(\text{PO}_4)\text{CaF}_2$) under average conditions is known to be less readily available to crops than that in the more soluble $\text{CaHPO}_4$ and $\text{Ca(H}_2\text{PO}_4)_2$ of superphosphate. Roberts, et al. (5) reported that rock phosphate (30% total $\text{P}_2\text{O}_5$) became available slowly, particularly on limed land, but that over a long period yield of crops showed rock phosphate on unlimed soils to be as effective a source of phosphorus as one-half its weight in superphosphate (16% available $\text{P}_2\text{O}_5$). Scarseth and Tidmore (6) noted that the more insoluble the form of phosphate, the slower the fixation by the soil. Truog (8) presented data showing that $(\text{NH}_4)_2\text{SO}_4$ increased rock phosphate availability to plants, and the data also indicated that plants relatively high in calcium have a relatively high feeding power for the phosphorus in rock phosphate. The information available indicates that calcium in soil, as well as the calcium content of the plant, will influence the availability of phosphorus in rock phosphate.

The information now available regarding the influence of potassium on phosphorus availability does not indicate whether the potassium content of the soil, the potassium content of the plant, or both, are active in increasing phosphate availability. Thornton (7) reported that KCl applied as a potassium fertilizer increased the uptake of phosphorus from phosphatic fertilizers. Erkstein (1) reported that

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1Journal Paper No. 315, Purdue University Agricultural Experiment Station, Lafayette, Indiana. Contribution from the Department of Agronomy. Received for publication September 25, 1947.
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3Reference by numbers in parenthesis is to "Literature Cited", p. 770.