RESIDUAL EFFECTS OF ACID PHOSPHATE AND ROCK PHOSPHATE

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There is a growing need in the Middle West for phosphate fertilizers. With a more general recognition of this need comes the question, how long will an application of phosphorus benefit crops? To answer this question, the effect of applications of phosphorus carriers on crops grown on various soils should be determined over a period of years following the application.

Investigational reports are meagre concerning the length of time residual effects will occur after an application of a phosphate fertilizer. Some writers mention the duration of residual effects, but they do not give any data showing these effects. In planning systems of farming and soil management where it would be advantageous to apply the fertilizer only once or twice during the rotation, it is important to know how long the phosphate will have an effect on crop growth. The work reported in the following pages was planned to throw some light on the question by determining the residual effects of acid phosphate and rock phosphate on some typical Iowa soils in the field and greenhouse.

HISTORICAL

In reviewing the literature relating to the effects of phosphates on crops, an attempt has been made to summarize briefly the work which has been carried out in recent years in the United States and in some other countries. A brief discussion is given of all work relating directly to the residual effects of acid phosphate and of rock phosphate.

Abbott and Conner (1) studied the effect of an application of acid phosphate to a clay loam over a period of four years and their results strikingly illustrate the lasting effect on crop yields. In 1904 the crop was a failure, in 1905 the wheat was increased 6.4 bu., in 1906 the corn was increased 7.0 bu., and in 1907 the wheat was increased 1.6 bu.

A Committee Report (3) to the Board of Agriculture for Scotland proposes a scale showing the proportion of phosphate fertilizers left unexhausted in the soil. It is suggested that a scale cannot be more than an approximate indication of the rate of exhaustion of phosphates. Their scale shows that one-half of a superphosphate addition is left

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1 Contribution from the Department of Farm Crops and Soils, Iowa State College, Ames, Iowa. Received for publication January 30, 1925.

2 Assistant in Field Experiments.

3 Reference by number is to Literature Cited, page 186.