PHOSPHORUS FIXATION AS AFFECTED BY
SOIL TEMPERATURE

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It has been observed that in the southern states fall applications of phosphate fertilizers appear to give better crop response than spring applications, particularly with crops that require a high level of available phosphorus. Since soil temperatures at and near the surface of the soil are higher in the spring and summer than during the fall and winter and since many chemical reactions very nearly double their velocity for a 10° C rise in temperature, it seemed probable that the higher soil temperatures may have increased the rate of phosphorus fixation.

This problem apparently has received very little consideration. A number of years ago Fraps (2) added dilute phosphate solutions to different soils, agitated them at ½ hour intervals for 5 hours at temperatures of 0°, 31°, and 41° C, and then determined the amount of phosphate remaining in solution. With some soils a decrease in phosphate solubility occurred when the temperature increased, whereas with other soils temperature had very little effect. No study was made of the effect of temperature on phosphate solubility as measured by plant response.

The primary objective of this investigation was to determine the effect of soil temperature on phosphorus fixation as measured by plant growth.

EXPERIMENTAL PROCEDURE

After a preliminary trial had indicated that soil temperature was a factor in phosphorus fixation, a sample of Dekalb silt loam from an old, run-down pasture was selected for further study. Since the soil was strongly acid, it was limed to pH 6.5 and stored outside for a year before being used in this investigation.

A portion of the soil was fertilized with finely pulverized mono-calcium phosphate at the rate of 50 pounds P$_2$O$_5$ per acre on September 11, 1940. After thor-

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2Associate Agronomist. The writer wishes to express his appreciation to Dr. E. A. Hollowell, since it was at his suggestion that this problem was investigated.

3Figures in parenthesis refer to "Literature Cited", p. 306.