

EXPLORING LONG-TERM PHOSPHORUS MANAGEMENT STRATEGIES FOR OPTIMIZING CROPS YIELDS IN KANSAS

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ABSTRACT

Phosphorus (P) is a crucial nutrient for sustaining crop productivity, yet its scarcity often challenges agricultural endeavors. Recognizing the essential role of P fertilization in maintaining agricultural productivity, this study takes a multi-year approach to P management. It specifically delves into the intricate dynamics of long-term P placement, evaluating its impact on crop yield under varying rates and combinations. The primary objective is to discern the most effective phosphorus fertilization approach in the context of long-term agricultural studies in Kansas, aiming to maximize crop yield. The study began in Manhattan, KS, in 2006 and has 12 distinct treatments, each representing a different combination of diverse rates and placement methods in a 3-year rotation of wheat, corn, and soybean. By using a cyclical rotation, the study ensures that each phase is present annually, providing a comprehensive understanding of crop responses over time. Different variance analyses are employed to determine statistically significant differences in crop yields among the treatments. The optimal fertilizer treatment varies depending on the crop. Among all crops, wheat is the most responsive to P fertilizer. One of the most effective treatment combinations for all crops is to use 20 lb./ac as a starter fertilizer and then add an extra 60 lb./ac as deep band in wheat and corn and an extra 40 lb./ac in soybean, which was applied by broadcast. This study can contribute to the scientific understanding of phosphorus management and offer practical insights for optimizing fertilization strategies in Kansas's dynamic agricultural system. As we navigate the complexities of phosphorus fertilization, this research serves as a valuable resource for enhancing sustainable crop productivity.