Phosphorus Reduces Grain Moisture and Improves Corn Profitability

By Kevin Dhuyvetter and Alan Schlegel

Phosphorus (P) fertilization offers several benefits in corn production, including higher yields, hastened maturity, lower grain moisture at harvest, and higher profits. This article reports results of recent Kansas research.

PHOSPHORUS fertilization is essential for optimum production and profitability from irrigated corn in western Kansas. Corn plants deficient in P yield less and mature later than plants receiving adequate P. The role of P on crop maturity is often overlooked when analyzing the economic benefits from P.

A long-term nitrogen (N) and P study has indicated an optimal N rate for irrigated corn of about 160 lb N/A, **Figure 1**. Over the past six years (1988-1993), application of P (40 lb P_2O_5/A) has increased grain yields by about 80 bu/A annually.

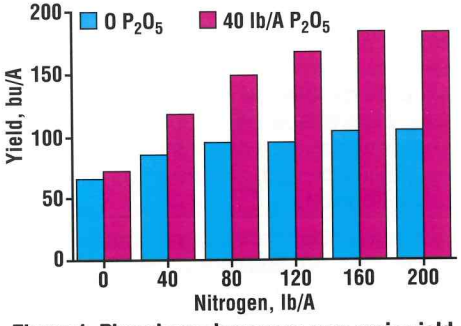

Figure 1. Phosphorus increases corn grain yield.

Phosphorus is essential for seed development and hastens crop maturity. In this study, the corn was not allowed to completely dry in the field prior to harvest. Earlier harvest reduces the potential for crop losses from lodging and adverse weather conditions. **Figure 2** shows that application of P significantly reduced grain moisture. At the optimal N rate, grain moisture was reduced from 27 percent moisture without fertilizer P to 22 percent with P.

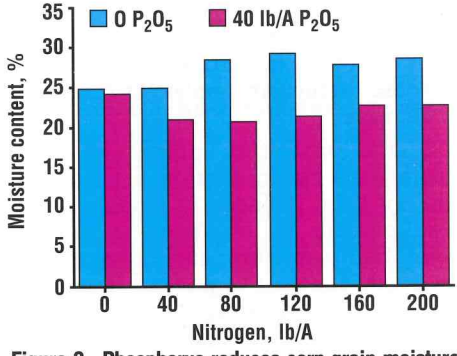

Figure 2. Phosphorus reduces corn grain moisture at harvest.

Artificial drying of corn is expensive. Estimated drying costs for each fertilizer treatment were calculated using a drying charge of 2¢ per bushel for each

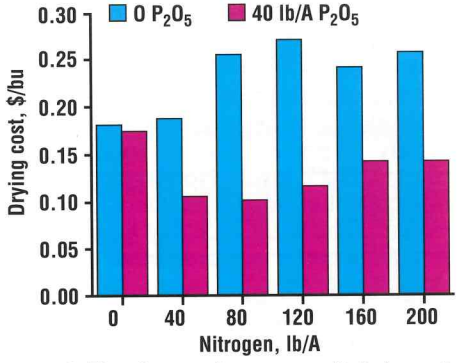

Figure 3. Phosphorus reduces corn grain drying cost.

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percent of moisture above 15.5. The addition of P reduced drying costs an average of 10¢/bu, **Figure 3**. At the optimal N rate, the drying cost was 24¢/bu without fertilizer P compared to 14¢/bu with fertilizer P.

The economic benefit from fertilizer P was calculated as the difference in net revenue at each N rate with and without P. Net revenue was calculated as gross revenue less drying and fertilizer costs. As shown in **Figure 4**, the economic benefit from P varied with corn prices and ranged from about $125/A with a corn price of $1.75/bu to over $200/A with a corn price of $2.75/bu.

The economic benefit from fertilizer P is twofold: it increases yield and decreases drying costs. Phosphorus increased grain yields by 80 bu/A and reduced drying costs by 10¢/bu. Based on a corn price of $2.25/bu, P fertilization increased net revenue by about $170/A.

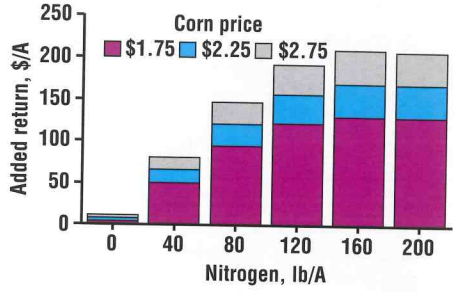

Figure 4. Phosphorus increases economic returns.

In addition to the direct economic benefit of fertilizer P, there are intangible benefits of corn maturing faster, such as: timeliness of field operations, reduced crop lodging, and increased marketing flexibility. It is important that these benefits of P are not overlooked. ■

WHEN adequate P is supplied, corn may mature 7 to 10 days earlier. Notice in this photograph with P applied that the shucks have already turned brown and plant drydown is advancing.

WITHOUT adequate P, plant maturity is significantly delayed. This photograph shows that P-deficient corn still has green leaves, stalks and shucks.

Greenhouse Gases . . . from page 9

as an alternate N source would have a negative effect on CH_4 emission levels, that is, more CH_4 would be emitted into the atmosphere.

Atmospheric CH_4 has been increasing 1 percent per year. The contribution from U.S. agriculture is estimated to be 7.7 million tons, or about 14 percent of total U.S. emissions. While it is estimated that rice paddies contribute 28 percent of the world's CH_4 emissions, the amount from this source in the U.S. is negligible. Ruminant animals are a large contributor of CH_4. Methane production from ruminant animals is still increasing on a global basis, but in the U.S. it is believed to be decreasing as animal production efficiency increases. ■