

# Phosphorus Fertilization Relieves Stresses in Irrigated Corn Production

By Alan Schlegel

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*Providing adequate phosphorus (P) is a key part of corn production in the High Plains. This article provides some visual evidence of the P effects on development and maturity of irrigated corn.*

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**PHOSPHORUS** fertilization is essential for optimum production and economic returns from irrigated corn in western Kansas. As much as 50 percent of the P needs for corn are taken up after tasseling, emphasizing its importance in grain development.



**PHOSPHORUS-DEFICIENT** plants are often stunted and mature later than corn supplied with adequate P. This can make a significant difference in grain moisture content at harvest and influence overall farm crop profitability.

A long-term study has shown irrigated corn yield benefits from added P increased over time, from no initial effect to over 100 bu/A higher yields after 30 years of production. Without P fertilization, soil P levels declined from 17 to less than 10 parts per million (ppm) within 5 years. The addition of fertilizer P is necessary for both maintenance of soil test P levels and profitable yields.

## Corn Phosphorus Deficiency Characteristics

### Roots

- poorly developed root systems

### Stalks

- stunted plants
- poor seedling vigor
- poor vegetative growth
- increased disease incidence

### Leaves

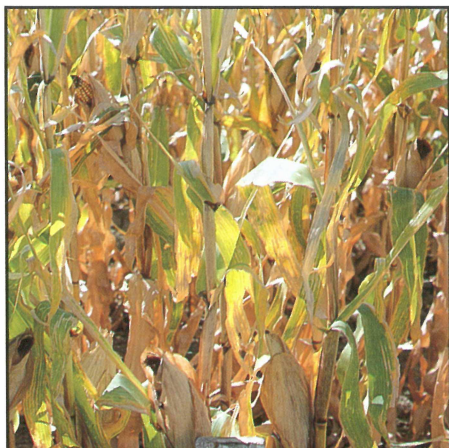
- purple color developing on lower leaves, intensity varies with hybrid
- lower leaves of some hybrids appear bronze with purple edges

### Grain

- poorly developed ears with irregular kernel rows
- slightly twisted cobs with barren tips
- delayed maturity
- reduced yields
- higher grain moisture at harvest

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



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

**PHOSPHORUS** influences corn root development. When adequate P is provided, the plant produces a dense, fibrous root system. Without P, roots are plump and not as fibrous. Note how P affects ear fill and maturity. Without P, ears are slightly curved and poorly filled, with some immature silks still attached. Phosphorus also has a significant effect on stalk size and quality, as shown in the photograph.



### Summary

Phosphorus fertilization is an important best management practice (BMP). It plays an important role in photosynthesis, respiration, energy storage, cell division, cell enlargement, and other plant processes. It promotes root growth and devel-

opment, helps plants withstand disease, enhances uptake of other nutrients such as nitrogen (N) and increases water use efficiency. Phosphorus is also vital in seed formation and improves grain quality. Irrigated corn production in the High Plains has agronomic, economic, and environmental benefits from P fertilization. ■