

K In NP Starters Helps Bump Corn Yields

Three-year study shows that adding potassium can supply extra punch to push yields higher, even though soils already test high in P and K.

Summary: In this three-year experiment, starters containing K as well as adequate amounts of N and P consistently increased early-season plant growth, nutrient content, and yield of ridge-till corn compared to starters containing only N and P. This occurred even though soil P and K levels were high. The NPK combination (30 lbs/A of N, 30 lbs/A of P_2O_5 , and 5 lbs/A of K_2O) yielded 12 bu/A more than the same N and P rates without K added. The results indicate that on some soils, K deficiency can be corrected with a small amount of K added to the starter.

The use of conservation-till, including ridge-till, has increased in recent years because of its effectiveness in conserving soil and water. Potassium (K) deficiency can be a problem on soils that have been managed with reduced-till practices. The large amount of residue left on the soil surface can depress soil temperature, as well as interfere with plant root growth, nutrient availability, and crop uptake. Liquid starter fertilizer applications have proven effective in enhancing K uptake, even on soils that are not low in available nutrients.

K is essential to many plant functions. A deficiency in K affects such processes as respiration, photosynthesis, chlorophyll development, and water content of

leaves. K also influences crop maturity. The appearance of K deficiency symptoms in fields managed with ridge-till has thus become a concern for producers.

K uptake in corn is greatest early in the season and decreases after 40 to 50 days of growth. Cool spring temperatures can limit early-season root growth and nutrient uptake. Early-season K deficiency can adversely affect corn grain yields.

The objective of this three-year study was to determine if K deficiencies could be corrected and corn yields

improved with a small amount of K applied in a starter at planting.

Twelve Bu/A Bump

The experimental area had been in ridge-till since 1984 and managed with an annual rotation of corn and soybeans. K deficiencies had been observed in this field prior to initiation of this study. Ear leaf K concentrations had been below the sufficiency range (1.5 to 1.7%).

Dry matter. The 30-30-5 starter treatment increased corn 6-leaf stage dry matter by 65 lbs/A compared to the 30-30-0 treatment.

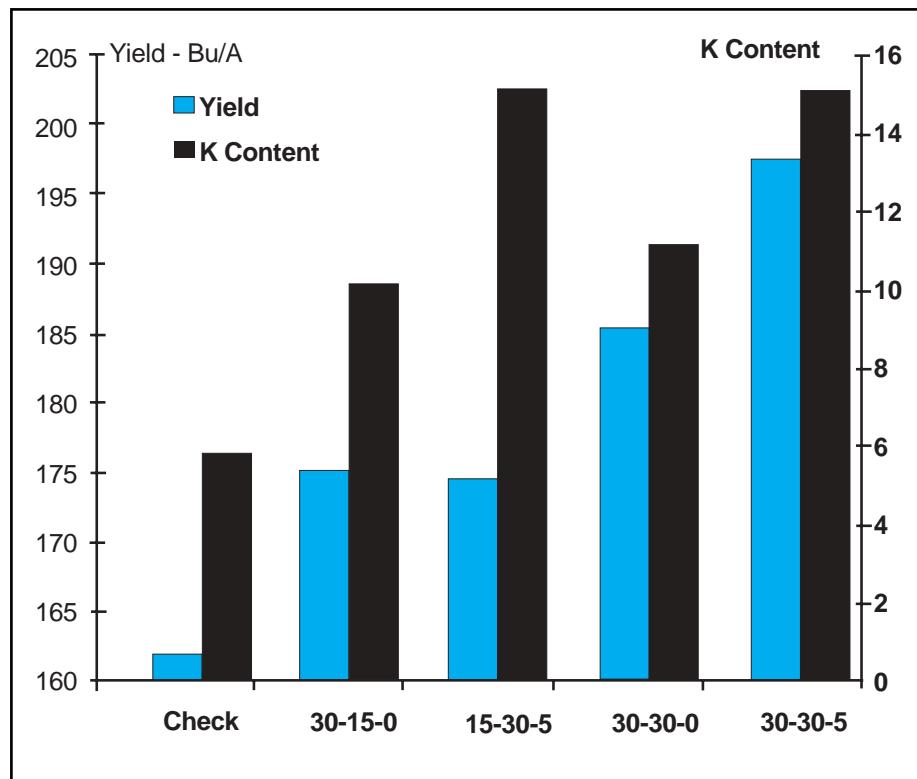


Figure 1. Starter fertilizer composition effects on corn grain yield, 2000-2002, Scandia, KS.

Six-leaf K content. The 30-30-5 starter treatment increased corn 6-leaf stage tissue K content by 4 lbs/A compared to the 30-30-0 treatment (Figure 1).

Yield. The 30-30-5 starter treatment increased corn grain yield by 12 bu/A compared to the 30-30-0 treatment (Figure 1).

Response time. The 30-30-5 starter treatment decreased the number of days from emergence to mid-silk compared to the 30-30-0 treatment.

In all cases, the 30-30-5 starter treatment was also superior to the 15-30-5 treatment, indicating that N is an important element of starter fertilizer composition.

All starter treatments improved early-season growth, nutrient content, and yield over the no starter check (Figure 1).

Conclusion

The results of this study indicate that K deficiencies can occur even though soil test levels are not low. A small amount of K included in a starter can correct the deficiency and improve corn grain yields.

Methodology

Site. This irrigated ridge-till experiment was conducted at the North Central Kansas Experiment Field.

Soil is a Crete silt loam.

Soil test showed that initial pH was 6.2. Organic matter was 2.4 percent.

Bray-1 P and exchangeable K in the top 6 inches of soil were 40 and 420 ppm, respectively.

Starters were made using 28% UAN, ammonium polyphosphate (10-34-0) and potassium thiosulfate (0-0-25-17). N was balanced so that all plots received 220 lbs/A regardless of starter treatment. On plots receiving no K as KTS, ammonium sulfate was included in the balancing N application.

Application. Starter fertilizer was applied 2 inches to the side and 2 inches below the seed at planting.

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