

by Dr. W.B. Gordon

# Fluid Starters Bump Yields in High P And High K Soils

Kansas field experiments on corn and soybeans compare two K sources and two placement methods at varying application rates.

**Summary:** In a three-year study (1997-1999) fluid starter fertilizers bumped corn yields as high as 47 bu/A and soybean yields as high as 12 bu/A. The increases occurred even though soil test P and K levels were high or very high. Variables in application rates, placement, and fertilizer source also showed effects (both positive and negative) on corn and soybean response to starters. In general, salt injury from a sulfate of potassium (SOP) starter proved to be less than that of a potassium chloride (KCl) starter when applied in-furrow.

Use of conservation tillage, including ridge-till, has increased greatly in recent years because of its effectiveness in conserving soil and water. In a ridge-till system, tillage at planting time is confined to a narrow strip on top of the ridge. The large amount of residue left on the soil surface can interfere with nutrient availability and crop uptake.

Liquid starter fertilizer applications have been effective in enhancing nutrient uptake, even on soils testing high in available nutrients. Many producers favor in-furrow starter applications due to the low initial cost of planter-mounted equipment and problems associated with knives and colters in high-residue environments.

Field experiments were conducted at our North Central Kansas Irrigation Experiment Field near Scandia. Our objective was to determine corn and

soybean response to starters in soils testing high in P and K, using two different fertilizer sources (sulfate of

potassium [SOP] and potassium chloride [KCl]) two different placement methods (in-furrow and 2 by 2), and

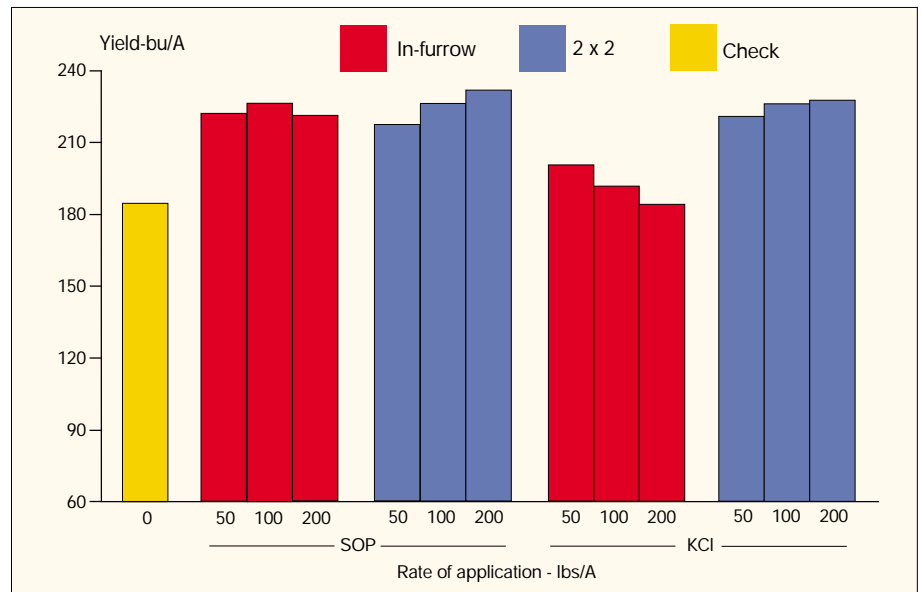


Figure 1. Effects of placement, rate, and potassium source of 7-21-7 fluid starter on corn yield, Scandia, KS, 1997

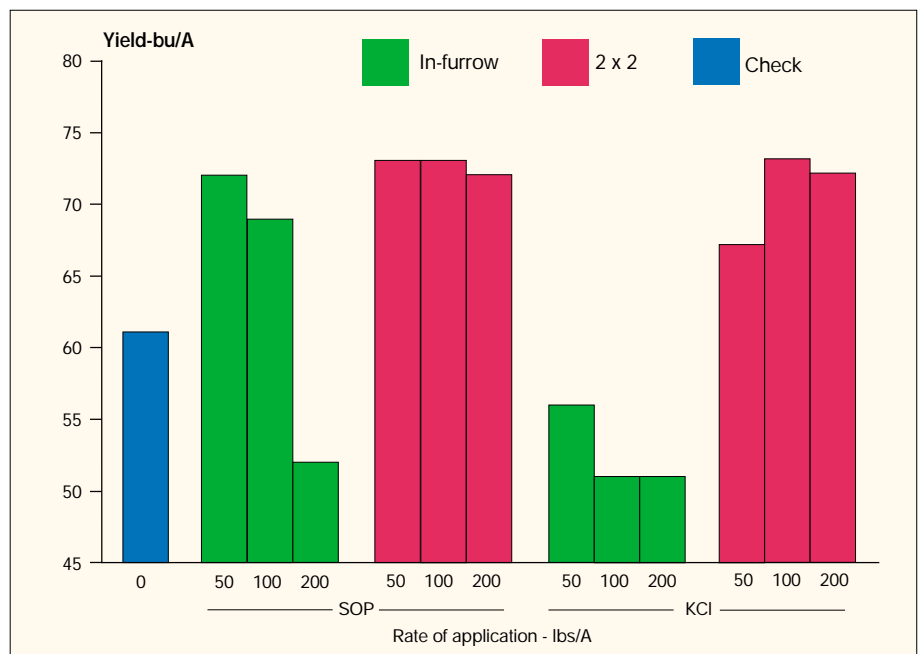


Figure 2. Effects of placement, rate, and potassium source of 7-21-7 fluid starter on soybean yield, Scandia, KS, 1997.

varying application rates. Data shown will be con-fined to our 1997 experiments, but results in 1998 and 1999 showed similar trends.

### **Corn**

*SOP.* As can be seen in Figure 1, fluid 7-21-7 starters produced yield increases over check as high as 47 bu/A in soils testing 43 ppm as a Bray-1 P and 380 ppm exchangeable K in the top six inches. Equally evident was the effect fertilizer source, rate of application, and placement method had on corn yields.

When the 7-21-7 SOP fluid starter was placed in-furrow with the seed, grain yields were not significantly different from those with fertilizer placed 2 by 2, except at the 200-lb/A rate, where response to in-furrow application was 11 bu/A less than 2 by 2.

*KCl.* Note in Figure 1 how yields were reduced at all KCI starter application rates when comparing in-furrow with 2 by 2. At 50 lbs/A of fluid 7-21-7, for example, grain yield was reduced 20 bu/A in-furrow compared to 2 by 2 and by as much as 43 bu/A at the

200-lb/A rate.

### **Soybeans**

*SOP.* As can be seen in Figure 2, fluid 7-21-7 starters produced yield increases over the check as high as 12 bu/A, again in soils high in P and K, and under conditions of varying fertilizer sources, rates and placement methods.

Note how yield declined when in-furrow starter application rates exceeded 100 lbs/A, while 2 by 2 placement yield levels remained steady. Below the 100-lb rate, in-furrow yield approximated 2 by 2.

*KCl.* When the 7-21-7 KCl starter was placed in-furrow with soybean seed, yields were reduced regardless of rate of application. At the 50-lb/A rate, yields were 11 bu/A less when the starter was placed in-furrow compared to 2 by 2. At the 200-lb/A rate, yields in-furrow were 21 bu/A less than those produced by 2 by 2 placement.

### **Salt injury**

In both corn and soybean experiments, in-furrow applications of the 7-21-7 fluid starter containing SOP resulted in less salt injury than the 7-21-

7 containing KCl.

### **Methodology**

*Soil* was a Crete silt loam. Analysis by the KSU Soil Testing Lab showed that in the corn experimental area initial soil ph was 6.4. Organic matter content was 2.4 percent. In the soybean area, pH was 6.5 and organic matter content was 2.2 percent.

*Supplemental N and S.* For the corn experiment, UAN was applied immediately after planting so that all plots received 200 lbs/A of N. Soybeans received no additional N. Sulfur rates were balanced so that all plots received the same amount, regardless of K source.

*Design* was a randomized complete block with three factors.

*Population.* On April 22, corn hybrid Dekalb brand 632 was planted at the rate of 31,000 seeds/A. On May 12, soybean variety Dekalb brand CX37ORR was planted at the rate of 200,000 seeds/A in 30-inch rows.

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