

What About N in NPK Starters?

Be careful, Kansas researchers warn, about how high you raise those N rates.

Summary: *The use of starters containing nitrogen (N), phosphorus (P) and potassium (K) significantly increased no-till and ridge-till corn grain yields compared to a broadcast N-only program, even though soil P and K levels were high. Increasing N rates above 20 to 30 lbs/A in a starter did not further increase yields. On dryland no-till corn, yields were increased 15 to 20 bu/A by using starters, while on irrigated ridge-till corn, starters increased yields by as much as 45 bu/A. Including sulfur (S) in starters appears to be a good management practice for early planting in no-till production systems.*

Research has shown that manipulation of starter fertilizer formulations in regard to concentrations of various nutrients can have substantial influence upon their effectiveness. Some producers are very interested in applying their total nutrient program at planting in order to reduce trips. Thus, the concept of high N starters has continued to develop over the past ten years.

Research has clearly shown that yield advantages accrue from higher N:P₂O₅ ratios in starters than can be produced by normal manufacturing processes. The advantages of higher N concentrations include 1) providing additional N supplied early in the growing season, 2) allowing additional flexibility in timing of supplemental N applications, 3) beneficial effects of soil P fixation reactions, and 4) enhanced P absorption

even on high P-testing soils.

Production of high N liquid starters necessarily requires blending of nitrogen solution (UAN) with other starter formulations. Since half the N in UAN is urea, banding higher concentrations of N close to the seed provides opportunity for the presence of free ammonia in proximity to the germinating seed. Crops are sensitive to free ammonia even on a very short-term basis and express that sensitivity in lowered seedling vigor and final stands.

Grower interest in higher N rates placed beside the row at planting under adequate rainfall or irrigated conditions, combined with dryland producer interest in applying all nutrients at planting, points to the need for evaluation of techniques to avoid this germination effect.

With this in mind, we conducted research evaluating starter management in conservation-till, applying higher N rates using different placements to

reduce risk of germination damage.

Manhattan

At our North Agronomy Farm in Manhattan, the use of starter, either in direct seed contact or dribbled over the row, increased yields compared to broadcast N only (Figure 1). Increasing N rates in the starter above 10 lbs/A did not increase yields further and final plant populations were significantly reduced at the 40- and 50-lb/A rates of N when placed in-furrow.

Starter N rates up to 50 lbs/A of N placed over the row and 120 lbs/A of N placed 2 x 2 had no effect on plant populations. These results suggest that when high N rates in a starter are used, the starter should be placed over the row or 2 x 2.

Scandia

At our North Central Experiment Field in Scandia, the use of starter increased early-season growth and increased grain yields on this ridge-till, irrigated corn when compared to no starter. Corn yield

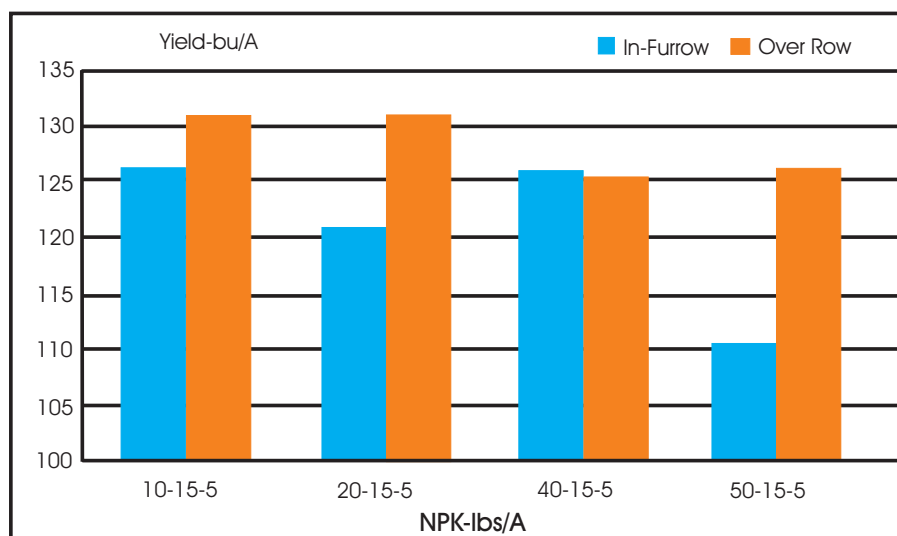


Figure 1. Evaluation of starter formulation and placement on no-till dryland corn, Manhattan, Kansas, 2000.

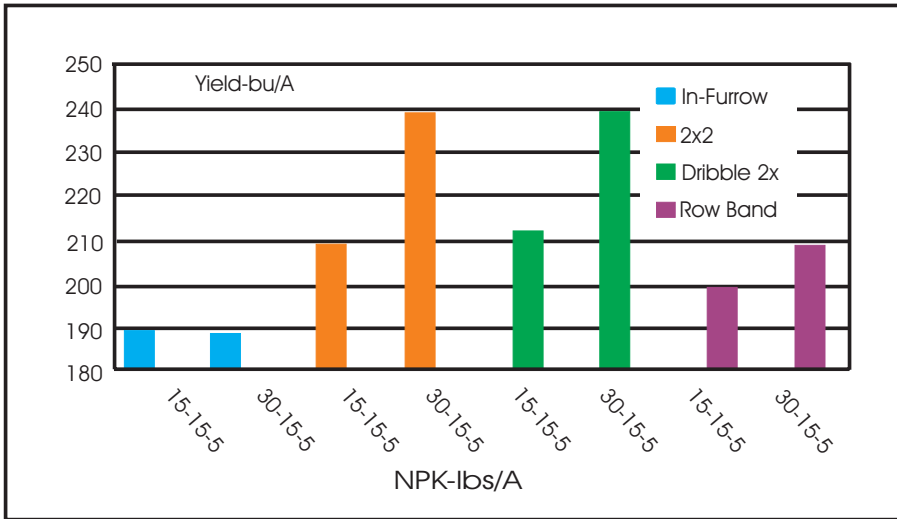


Figure 2. Effects of starter application method and composition on corn grain yield, Scandia, Kansas, 2001.

was lower when starter was applied in-furrow with the seed than when applied 2 x 2 below the seed (Figure 2). Dribble application in a narrow surface band two inches to the side of the seed row resulted in yields equal to 2 x 2 applied starter, indicating a surface band application was equal to sub-surface starter placement. The band-over-the-row treatment resulted in yields greater than the in-furrow treatment but less than the 2 x 2 or surface band treatments, possibly due to placement on top of the ridge and in a wider (8-inch) band. Increasing N rates in the starter up to 30 lbs/A in the starter, however, did not further increase yields.

Drs. Lamond and Gordon are professors, and Niehues and Olsen are former graduate student, Department of Agronomy, KSU.