Strategies for Corn Sidedress Nitrogen Placement in Michigan

Is closer N placement to the plant the key to improving corn grain yield?

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Greater emphasis has been placed on applying nitrogen (N) closer to peak uptake periods in a more efficient manner thus improving corn N recovery and reducing the risk for N loss. Although few yield benefits to delayed timings of N application have been observed in this region, greater flexibility may exist with mid-season N placement strategies. New technologies have been developed to increase application efficiency by applying N more quickly and placing N closer to the plant. Instead of conventional coulter-inject sidedress N placement located 15 inches from the corn row, Y-drop application can place N adjacent to or in the vicinity of the growing plant.

The Corn Marketing Program of Michigan (http://www.micorn.org) supported studies in Richville and Lansing, MI, in 2017 to evaluate multiple N placement strategies. Nitrogen rates were consistent across strategies at 170 and 145 lbs N per acre in Richville and Lansing, MI, respectively. Three N application strategies were utilized and included:

- 50/50: 50% of N pre-plant incorporated, 50% sidedressed at V6
- 0/100: 0% of N pre-plant incorporated, 100% sidedressed at V6
- 2x2: 40 lbs N in a 2x2 at planting, remainder of N sidedressed at V6

Within each strategy, sidedress N methods included: traditional coulter-inject and Y-drop applications. Sidedress applications were made on 6 June 2017 in Richville and on 9 June 2017 in Lansing with grain yield adjusted to 15.5% moisture.

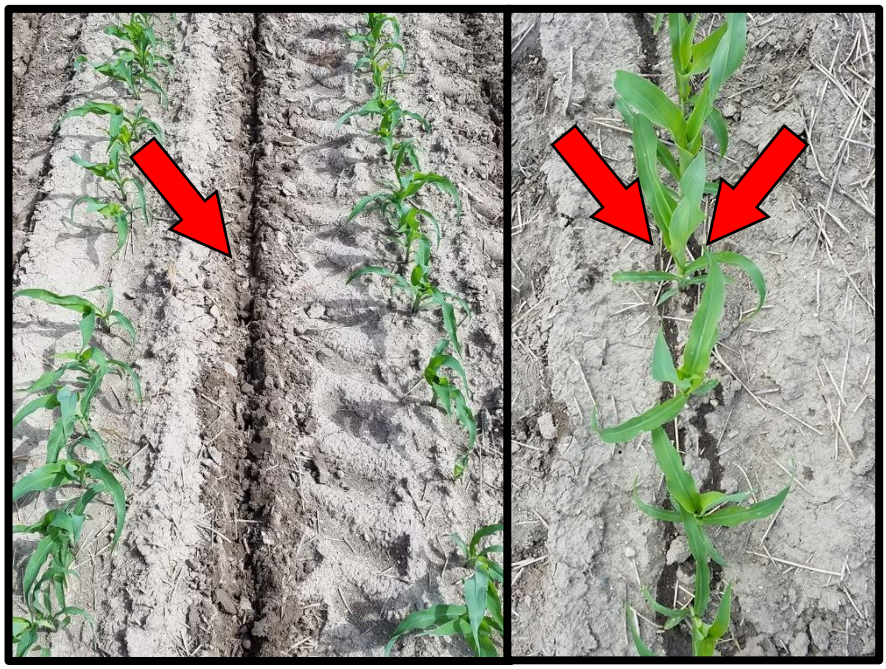

Figure 1. Coulter-inject (left) compared to Y-drop (right) N sidedress application methods. Red arrows indicate N placement. Coulter-inject placed N approximately 4 inches deep directly in-between 30-inch corn rows while Y-drop placed N on the soil surface near the growing plant.

Averaged across N strategies, positive yield gains were not achieved using Y-drop application at either location. In Richville, Y-drop application reduced yield 16 bu A^{-1} (Fig. 2) and profitability \$58 A^{-1} when compared to coulter-inject. Similar results were obtained at the Lansing location but were not statistically different with Y-drop application reducing yield 9 bu A^{-1} (Fig. 2) and profitability \$36 A^{-1}.

No rainfall events occurred within 5-8 days of sidedress application at either location which may have restricted some degree of N movement into the root zone. Water is one of four factors along with oxygen, the specific nutrient, and the root itself required to be in the same place at the same time for root nutrient uptake. Daily wetting and drying of surface soils caused by evaporation can limit downward movement of surface-applied nutrient applications into the soil profile.

Preliminary data from the current study indicated sidedress N placement closer to the plant at V6 resulted in similar or reduced grain yield when compared to traditional coulter-inject during drier soil conditions. Corn N response is greatly influenced by soil moisture conditions and will require additional evaluation under variable Michigan weather conditions. Studies will continue in 2018 to further evaluate sidedress N placement strategies. For additional information on this research trial and others, please visit the MSU Soil Fertility Research website (https://soil.msu.edu/) and view our online video updates (https://soil.msu.edu/resources/bulletins/). Dr. Steinke's work is funded in part by MSU's AgBioResearch.

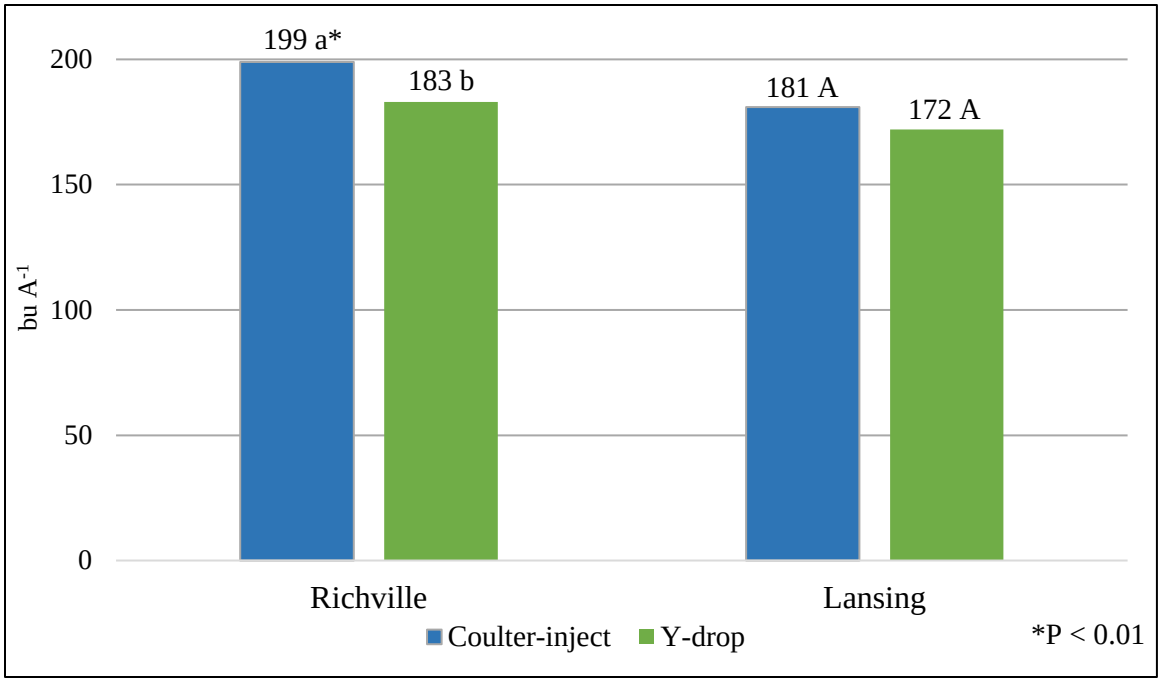

Figure 2. Corn grain yield as affected by sidedress N placement, Richville and Lansing, MI, 2017. Within each location, mean values followed by the same letter are not significantly different at $\alpha = 0.10$.