

Sidedressing saved money and N in 2015

Many dairy farms have fields that are too far from home to have manure applied, have landlord limits to manure application, or the farm just doesn't have enough manure to go around. How should the nitrogen (N) needs of these fields be met?

Application of urea or other N sources near planting time is a sure way to get the job done. But is it the best way? Some options were tested at Cornell University's research farm in the 2015 growing season. Conditions in this season were less than ideal, and one that many farmers would like to forget.

The Central NY research farm had 2.3 and 4.1 inches more rainfall in May and June than the 40 year average, followed by drier than normal July and August weather. On top of challenging planting and hay harvest conditions, a N-related question also arose: Would it pay to fertilize the patchy yellow corn crop observed in many fields? Current fertilizer guidelines in New York include sidedressing N along with a modest rate of banded N fertilizer at planting. Early season N against sidedress application on corn was tested on plots in previous years, but spring conditions were relatively dry and no timing rate differences were observed. In wet conditions, sidedressing of N was expected to deliver the benefits of high-

Sidedressing provides better N recovery by crops than early season application in wet years.

er N use efficiency and lower risk of N losses through leaching, volatilization, and denitrification. The 2015 season, with eight inches of rain in June, along with a not-so-well-drained site (ranging from somewhat poorly to moderately well-drained) provided perfect conditions to test early-season versus sidedress applications of N fertilizer. Two N application timings were employed:

- 1) Broadcast application of coated urea fertilizer (urease inhibitor) at planting in early June;
- 2) Shallow placement by knife shank of urea ammonium nitrate (UAN) in early July.

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After each application timing, 0.7 to 1 inch of rainfall was observed within five days. Broadcast N rates at planting application were 0, 50, 100, 150, and 200 lbs N/acre. N rates at sidedressing time were 0, 50, 100, 150, 200, and 250 lbs N/acre. Corn was harvested for grain in November 2015. All plots received 20 lbs N/acre in the starter band.

Yields were impacted by the weather and were 46 and 30% lower compared to yields from these same plots in previous years (2013 and 2014). Even the highest rates of sidedress N could not overcome the yield-limiting wet conditions at this site. In 2015, frequent early season rainfall created waterlogged soil conditions at times for two to three days in duration, meaning plant roots were often oxygen deprived. Lack of oxygen stresses young corn plants and prevents good root development because the growing point is below the soil surface until the V6 growth stage (about six leaves with visible collars).

By mid-July, all the N plots that received broadcast urea at planting, even those with the 50 pound per acre rate, looked visually healthier than the sidedress N plots. This means that not all of the N applied at planting was lost by mid-July. However, at the end of the growing season, it was the sidedress N plots that looked better (Figure 1), and yield measurements show they also yielded better. At the end of the growing season, yield leveled off at the 150 lbs/acre sidedress N rate (121 bu/acre). To obtain

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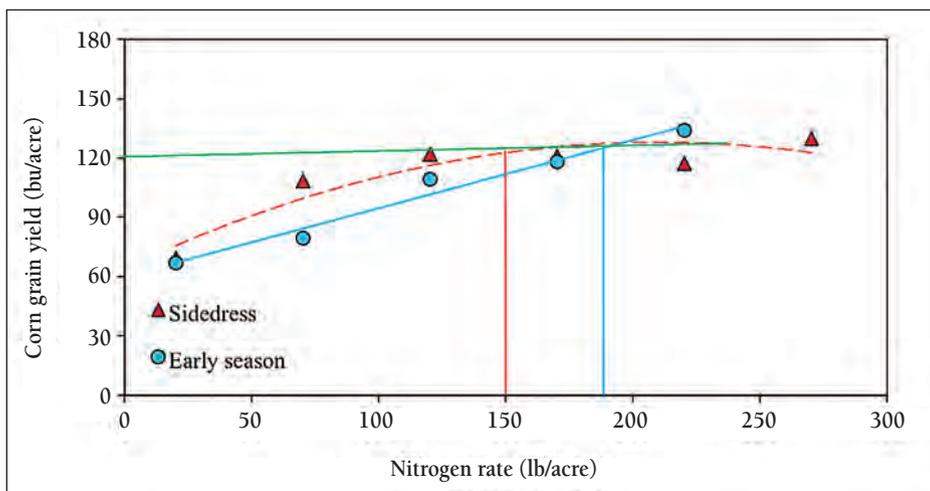


Figure 1. Pictures of corn crops in early September received 150 lbs of N/acre at planting (top) and sidedressing (bottom).

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the same yield with N applied at planting, 180 lbs/acre were needed (Figure 2), and likely more N would have been needed for the early season surface application if a urease inhibitor had not been used. This research shows that in a weather challenging year, sidedressing N provides the most efficient method of N fertilization for corn, as long as sidedressing can be done. Past research, in dry to average years, where early season N losses from urea was expected to be low, pre-plant N application at normal rates worked as well as sidedress N. It is likely that similar results would be observed in cases where manure applications were not sufficient to meet crop N needs. Sidedressing is the ideal “just-in-time” application method for optimum N recovery because N is applied when rapid crop uptake is imminent. Using a nitrification inhibitor when N fertilizer applications are done at planting (and also a urease inhibitor if urea cannot be incorporated) can reduce N losses during growing seasons like those experienced in 2015. These results also suggest that farms could benefit from testing N rates, or at least leaving untreated or half-rate check strips when adding supplemental fertilizer as a way to get better information about how fields respond to N. This can help improve decisions in future years and help the wallet and the



Figure 2. Corn grain yield as affected by rate and time of inorganic N application in 2015. Application rates are sum of starter band N rate at each application timing. At the end of the growing season, yield leveled off at the 150 lbs/acre sidedress N (121 bu/acre). To obtain the same yield with N applied at planting, 180 lbs/acre were needed.

environment at the same time. □

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Value of manure lingers long after application

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over five years, total alfalfa/grass DM yield was 21% higher in compost and high manure plots (average of three treatments) than low and non-manure plots (average of three treatments) (Figure 1). The lower manure rate was not able to maintain the higher yields in the fourth year of the stand, showing lower alfalfa/grass yields in 2009 and 2010 than where the compost or the higher manure rates were applied. During the alfalfa years, P and K levels remained optimal. The decreased alfalfa/grass yield observed with the low manure rate in the fourth and fifth year of the stand may in part reflect a difference in sulfur supply in those years. Producers should check their

alfalfa/grass stand for sulfur status if manure has not been applied more than two years previously.

Manure or compost applications on a field can have significant impact on crop yields, even years after the last application. These results should help dairy producers have productive discussions with crop neighbors about the value proposition associated with manure. Crop producers who have had manure applied for free or for the cost of application have been getting a pretty good deal! □

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