

Is That Enough Nitrogen?

March 17, 2022

Emerson Nafziger, University of Illinois

While N fertilizer prices remain high, at around \$0.90 per lb of N as anhydrous ammonia and in the vicinity of \$1.00 per lb of N as UAN or urea, recent increases in the price of corn have produced moderately higher MRTN N rates from the [N rate calculator](#). As an example, with N at \$1.00 per lb and corn at \$7.00 per bushel, the MRTN rate for corn following soybean in central Illinois is 167 lb N per acre, with high and low ends of the MRTN range at 158 and 176 lb N. This is the rate that previous N rate trials predict will maximize the dollar return to N.

Whether we use N rates in the MRTN range or amounts higher than that, canopy color almost never tells us whether that the amount of N was less than, about equal to, or more than the crop needed. Higher N rates often produce no visible change in canopy color, and N deficiency symptoms rarely appear unless soils stay wet for a period of time, in which case symptoms are worse in lower-lying parts of the field.

While we plan to continue to add data to the database for the N rate calculator, we are also initiating a new program that we think will help improve the MRTN approach. It will also tell us how much, if any, yield we gain by using higher N rates, or lose by using more modest N rates. Where possible, we hope to use aerial imagery (drones) to monitor canopy color development and match it to yield differences.

Here's the plan for doing trials like this in the field:

1. Each trial will have only two rates:
 - a. One is the N rate already planned for the field, counting all sources of N: MAP/DAP, pre-plant N, N applied with herbicide, and sidedressed N. We'll call this the field N rate (FNR).
 - b. If the FNR is around the MRTN rate (180 lb N or less in central and northern Illinois and 200 lb N or less in southern Illinois for corn following soybean; 210 lb N or less for corn following corn), the comparison N rate (CNR) will be 50-60 lb more than the FNR. If the FNR is 225 lb N or more, the CNR will be 50-60 lb less than the FNR.
2. The CNR is applied in a single strip through the field at a chosen location in the field, well away from the edges of the field. A second strip can be placed in another part of a large field, or the comparison can be done in several different fields.
3. The CNR strip should be wide enough to allow yield data to be collected from two combine harvest passes, with each pass compared to a harvest pass at the FNR next to (on each side of) the CNR strip. For example, if the N applicator covers 40 ft. and the corn head is 8 rows (20 ft.) wide, one applicator pass is enough, although two passes might be better. Mark both sides of the CNR strip with flags, and with GPS if possible.
4. Yields from the four passes (two at the CNR and two at the FNR) will be taken using a combine yield monitor, with each harvest pass labeled as a separate load if possible.

When we introduced this approach for the 2021 season, we suggested making plots an acre or so in size at several places in a field, using the same rates and procedures as outlined above. That remains an option for those who prefer that layout. The plot N rate will usually need to be specified on an application map for accurate placement. Harvest is the same, with two passes strips in the CNR strip and two at the FNR next to the CNR strip on each side. Such plots need to be 250 to 300 ft in length in order to get accurate yield-monitor yields.

Our goal is to have some of these comparisons in every agricultural county in Illinois in 2022, with hopes to expand this number in the coming years. If you have interest in participating, please contact Dan Schaefer dan@ifca.com (217 202-5173). South of I-70, John Pike jpik1.ag@gmail.com (618 727-1234) is the contact.