## Validating N Fertilizer Rates for Illinois Corn

The MRTN approach to setting fertilizer N rates in corn generally shows lower N rates than the yield-goal-based rates used before the MRTN, which raises questions as yields continue to increase. This project builds on the 500+ N rate trials in the MRTN database to answer an important question:

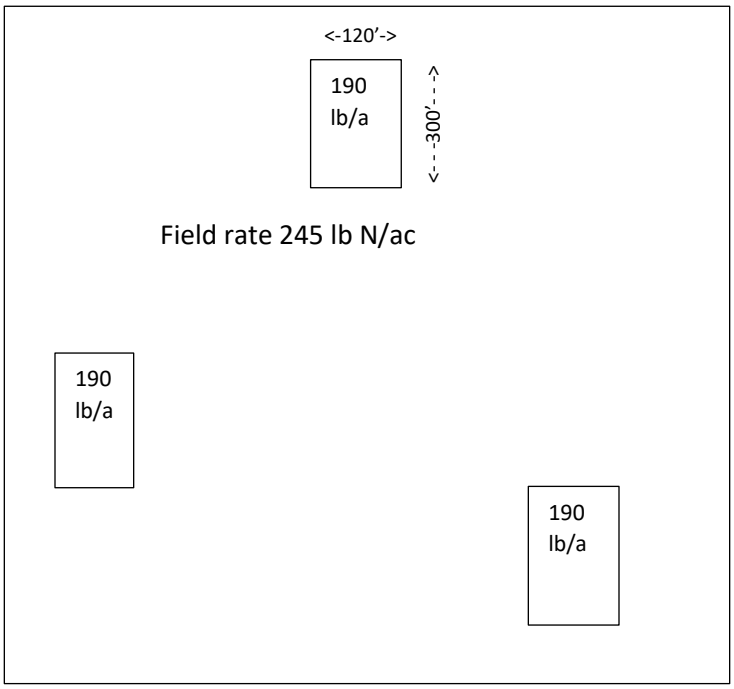
**How can we know that the MRTN rate is high enough for today's corn yields?**

In each field there will be several plots with an N rate paired with the rate already used in the field to show how yields from using the MRTN rate compare to yields with a higher N rate. This information will help provide confidence with rate decisions, and, along with aerial images, may help show how soil and weather information can be used might help further improve N rate decisions.

- Two to four plots, each about half- to three-quarters of an acre, will be placed in a field, with two plots in each major soil type in the field, if the types differ in productivity or drainage.
- The N rate chosen by the producer for the whole field will be the "base" N rate, and the rate used in the plots will depend on the base rate:
    - If the whole-field rate is within the range of the MRTN (170 to 200 lb N/acre for corn following soybeans), the rate used in the plots will be 50-60 lb N higher than the rate used in the bulk of the field
    - If the whole-field rate is 230-240 or more lb N/acre, the rate used in the plots will be 50-60 lb lower than the rate used in the rest of the field
    - Whether to use higher or lower rates in cases where the base rate is 200-230 lb N will be decided in discussion with the producer: there's little need to have rates that differ by less than 20 lb N per acre, and a goal is to have one rate less than 200-210 lb/acre
- All field operations will be done using regular application equipment and combine yield monitors, with preloaded application maps and with capability to upload yield monitor data during or right after harvest.
- N application will be made whenever the producer applies N; this can be fall $NH_3$, or any form or timing of N in the spring.
- All of the N used needs to be included in the base rate: main application, planter-applied N, N applied as herbicide carrier, etc.
- Plots need to be wide enough and long enough to get good yield-monitor yields from each side of each plot, and to allow yields to be taken from outside the plot on both sides: this will produce two sets of yield comparisons (higher vs lower N rates), one each side of each plot. A typical size might be 32 rows (80 ft.) or 48 rows (120 ft.) wide by 300 ft long; plots can be narrower than this if the corn header is narrower.
- Applying N parallel with the rows is preferred. If $NH_3$ is applied on an angle to the row, plots need to be wide enough to allow uniform-rate strips to be harvested both inside and outside the plots.
- It is critically important that yield monitor data be easily and quickly available during or immediately after harvest.
- Drone or other imaging technology can be used to monitor crop canopy color and to see if and when color differences appear between plots and areas outside plots. We will not, initially, do this as part of the project, but encourage local efforts to take drone images of the fields with plots.

Sample layouts

Field with a uniform soil type




Field with two major (substantially different) soil types