SPRINGTIME PRECIPITATION TOOL – CORN NITROGEN APPLICATION NEED

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Wet springtime conditions typically raise questions about the status of applied nitrogen (N). Or the question, do I need to apply additional N to my cornfields? At this time we do not know what the weather/precipitation will be for the entire springtime, but the extended period of wet conditions this spring is of concern. A summary of long-term N rate trials with continuous corn and corn rotated with soybean conducted at seven ISU research and demonstration farms in Iowa from 1999 to 2016 has been an on-going basis for indicating the potential for needing an N rate greater than the MRTN rate suggested by the Corn Nitrogen Rate Calculator (CNRC). That is, a way ("tool") to adjust applications when a greater than normal (MRTN) rate would be appropriate.

The "tool" developed from that long-term research is the accumulated total springtime precipitation. Either March through June in Southeast Iowa or April through June in the Main area of Iowa (areas delineated within the CNRC). The database from those long-term trials provides 216 crop rotation/site-years of data. The analysis indicates that the Southeast area of Iowa should use accumulated March through June precipitation, and the rest of Iowa April through June precipitation. Precipitation totals during those periods were evaluated for each of the site-years against the occurrence of an economic optimum N rate (EONR) more than 20 lb N/acre greater than an MRTN rate. The MRTN rates used were 140 lb N/acre for corn following soybean and 188 lb N/acre for continuous corn in the main area of Iowa and 154 lb N/acre for corn following soybean and 204 lb N/acre for continuous corn in the Southeast area of Iowa. Why the more than 20 lb N/acre? An assumed need of at least a 20 lb N/acre rate to be worthwhile to apply (potential for a yield response adequate to pay for the application and N fertilizer cost) and to provide some buffer due to uncertainty in the data analysis.

Evaluation of the precipitation and N response data indicated that an accumulated April-June precipitation amount (like a trigger level) of more than approximately 15.5 inches (can round to 16 inches) in the main area of Iowa or March-June precipitation total of more than approximately 17.8 inches (can round to 18 inches) for the Southeast area of Iowa correctly estimated if additional N was or was not needed 76 percent of the time (i.e. the MRTN rate was adequate or not). Obviously not a perfect determination, but pretty good odds of a correct determination. Many things affect soil N supply and N loss, which is why the evaluation is not perfect. Additional complications this year arise from delay in planting, late N applications, and corn N response with wet conditions. Ponded areas of fields would have high gaseous loss through denitrification, so short-term high precipitation events could cause more rapid N loss than indicated by the springtime total, especially when soils are warm in June. Or high rainfall events cause runoff and therefore not all of the precipitation would affect N within the soil. Therefore, variation in N loss, additional N need, and potential for crop response will differ among fields. In addition, an evaluation is needed of corn plant health and potential for plant response if N were to be applied.

Unfortunately, this precipitation tool is not reliable enough to indicate how much additional N would be needed. It is directionally correct (that is, the more precipitation is greater than the indicated precipitation trigger level, the more N needed), but cannot be calibrated to a specific rate. Somewhat depending on the already applied N rate, a suggestion would be to limit a supplemental N application to no more than 50 lb N/acre. This suggestion assumes that an N rate was already applied close to the MRTN rate. If the rate was much less than the MRTN rate, then more than 50 lb N/acre could be considered. If an N rate was well above a CNRC suggested rate, then the chance of being short of N is much less than indicated by the precipitation tool.

If you do not have a rain gage at your location or at your fields, you can access precipitation totals for weather stations across Iowa from two networks. One is the National Weather Service Cooperative Observer Program (NWS COOP) network and the other is the ISU Soil Moisture network. Both precipitation data sources are available from the ISU Iowa Environmental Mesonet.