

CORN NITROGEN RATE CALCULATOR WEBSITE

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If you are not familiar with the Corn Nitrogen Rate Calculator

The [CNRC](http://cnrc.agron.iastate.edu/) is an online tool that allows determination of N application rates for corn production and is helpful in determining the effect of fertilizer and corn price on needed rates. The Corn Nitrogen Rate Calculator web site (<http://cnrc.agron.iastate.edu/>) uses an approach to recommended N rates called the Maximum Return To Nitrogen (MRTN). The economic return to N is determined for user defined N and corn prices, with the maximum return point determined as the MRTN rate. An under-utilized output is the Most Profitable N Rate Range, which is a range of N rates that provides nearly the same economic return to N application, but with different risks. Despite being first implemented in 2005 (14 years ago), there remains uncertainty and lack of knowledge of the CNRC/MRTN approach to rate guidance. Another source of uncertainty is that N rates are not yield-goal or yield-potential based.

The MRTN method follows an approach to N rate guidelines developed and implemented regionally in seven Corn Belt states ([Concepts and Rationale for Regional Rate Guidelines for Corn](#)). One key component of the MRTN rate and most profitable range is the direct use of recent N rate response trial data, that is, use of mathematical regression-fit models. This direct database use is unique, and perhaps the first time implemented, for a rate-based crop input. The N rate response trials are conducted and accumulated within each state. The approach to rate calculation is the same in each state, but the research data is unique, and hence the rate suggestions unique to each state. The same for decisions on implementation of sub-state regions. A second key component of the MRTN rate is determination from the yield increase (response) to N rate, not the yield level (not yield goal or potential). The response (increase in yield) is what pays for the N input (economic based on fertilizer price and corn price), and the maximum economic response from across the rate trials determines the MRTN rate and most profitable rate range. Sub-state regions use rate response trials specific to the individual regions. When a user of the CNRC inputs a state, and or a state region, then only response trials are used that fall within that state/region. This makes the recommended N rate not only specific to the region, but specific to the actual research and economic price parameters of interest.

A few important scientific concepts drive the CNRC and MRTN determination. First, it is a uniform approach developed across Midwest Cornbelt states. This is important as it is now well-documented how N rate recommendations are determined. No uncertainty about methods for rate determination, and a robust system that is easy to implement. Second, is a known database of recent N rate research trials. No uncertainty in the data used to drive the output and rate recommendations. Third, a well-defined economic basis for determining optimal N rates – yield response and economic payback. Fourth, a recognized uncertainty in rate selection – the Most Profitable N Rate Range. Nitrogen fertilization need and corn response is one of the most uncertain crop input decisions. The CNRC addresses part of the uncertainty by use of a recent and large N response database, but also a look at economic response across that database to help guide decisions on use of a rate more or less than the MRTN rate.

The direct incorporation of a research-based N response trial database is an important step forward in N rate guidance in corn. The database allows rate recommendations to be dynamic as they are derived across current climatic conditions, hybrids, soils, and management; and change as new research is incorporated into the databases. However, the downside is that unless rate trials are continually conducted, the database and hence recommendations become outdated. This is a challenge and a concern for the future of N rate recommendations for corn production, no matter the system. And something that needs researcher and stakeholder discussion to find a viable path forward.

CNRC Update

The CNRC will be updated with a revised Iowa N response trial database. However, the changes to the Iowa database will be small and therefore likely no changes to currently suggested N rates in Iowa. Some of the other participating states are also updating their database.

Resources for Nitrogen Rate Decisions

The *Corn Nitrogen Rate Calculator* Web tool is located at <http://cnrc.agron.iastate.edu/>.

Publication CROP 3073, *Nitrogen Use in Iowa Corn Production*, can be ordered through any ISU county extension and outreach office, downloaded from the ISU Extension Online Store at <https://store.extension.iastate.edu/>, or by calling (515) 294-5247.

The regional publication *Regional Nitrogen Rate Guidelines for Corn* (PM 2015) can be ordered through any ISU county extension and outreach office, downloaded from the ISU Extension Online Store at <https://store.extension.iastate.edu/>, downloaded from the CNRC website, downloaded from the ISU Agronomy Extension Soil Fertility website, or by calling (515) 294-5247.

The ISU Agronomy Extension Soil Fertility website is located at <http://www.agronext.iastate.edu/soilfertility/>

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