

Helpful Hints for Adapt-N Users

- ✓ An accurate yield goal estimate is essential for effective nitrogen recommendations from Adapt-N.
- ✓ Soil organic matter content influences nitrogen recommendations by Adapt-N; It is a good idea to evaluate how your input of soil organic matter content changes sidedress nitrogen recommendations.
- ✓ Adapt-N's ability to easily provide nitrogen recommendations for different scenarios is a great way to learn about nitrogen losses and gains in a field. For example, obtaining sidedress nitrogen recommendations for 2.8% organic matter vs 3.5% organic matter, or recommendations for the V8 stage of growth when you sidedressed at the V2 stage of growth.

NutrientStar learned much about how Adapt-N functions from three seasons of testing the model from 2015 to 2017. The findings and suggestions below are compiled from consultants who implemented Adapt-N field trials for NutrientStar or who use Adapt-N in their business and from comments of the NutrientStar Science Review Panel as they reviewed Adapt-N field trial results. These findings are intended to inform and assist others in optimizing use of the Adapt-N model, and to provide insights and nuances about model performance that go beyond the basic numbers in the tables.

In presenting these findings our intent is to point out that one fertilizer management model or product should not be used as a “one size fits all” strategy or a single solution to a farm’s fertility plan. Technologies like Adapt-N and nitrogen stabilizer products are tools in the fertilizer management toolbox that can supplement agronomic practices that seek to optimize the 4Rs of fertilizer management and increase returns to fertilizer and soil health.

The NutrientStar team considers fertilizer management to be a progression along a continuum as new information becomes available and practices spread across the Corn Belt. We provide reports and results from evaluations of nitrogen management technologies on our website in an effort to contribute to continuous improvements in fertilizer management. The manufacturers of fertilizer management technologies who are willing to share performance data about their technologies and work to improve their offerings also contribute to that goal. We welcome your feedback and suggestions to improve NutrientStar’s program.

Important Findings about Adapt-N

For any model, inputs into the model greatly affect the outputs. In the case of Adapt-N, we have found the model’s nitrogen recommendations are sensitive to yield goal, rooting depth,

soil organic matter content and manure N content. In some cases, consultant knowledge of the field can improve input accuracy, but in some cases the input default values may be more accurate. The Adapt-N user should evaluate the inputs carefully and decide if their knowledge is sufficient to change default values.

Specific findings are discussed below.

1) Yield goal

Average yields are steadily increasing across the Corn Belt and year-to-year variations in yields are also increasing. This makes calculation of an accurate yield goal difficult. The Adapt-N guide recommends using the fourth highest yield from the past five harvests as a target yield goal (Moebius-Clune, 2014), but this means that for a corn-soybean rotation the corn yield record goes back 10 years. The Adapt-N web site recommends using “the highest yield from the past five years” (Anonymous, 2015). Because a yield goal is a projection into the future and therefore is difficult to estimate from previous yields, an estimate of yield *potential* may provide better nitrogen sidedress rate recommendations from Adapt-N.

Use of the Hybrid-Maize model to predict potential yield a few days before the time of sidedress can help check whether the fourth highest yield or the highest yield from the past five harvests is a good yield goal to use. A yield target that is 80-85% of the simulated yield potential provides a useful estimate of the attainable yield (i.e., a reasonable yield goal) with good crop management. The Hybrid-Maize model is available for \$35.00 at:

<https://marketplace.unl.edu/nutechmarketplace/software/hybrid-maize-2016.html>.

The yield goal estimate is the factor having greatest influence on crop nitrogen requirement and so it is important to have robust estimates of an appropriate yield goal when using Adapt-N.

2) Rooting depth

Consultants evaluating Adapt-N in NutrientStar trials have sometimes altered the rooting depth from the default value. Use of the altered rooting depth sometimes improved model performance and sometimes it did not. We recommend altering the rooting depth only if site-specific information strongly suggests default values from the SSURGO database are not accurate.

3) Manure nitrogen content

Accurately estimating nitrogen availability from a one-time application of manure is difficult. This difficulty is compounded for fields with long histories of manure applications, and accurately estimating nitrogen availability in fields with long-term manure histories is extremely difficult. A model like Adapt-N can help users learn how manure applications change nitrogen recommendations. Adapt-N allows users to easily obtain numerous sidedress nitrogen recommendations based on different inputs. The ability to run different scenarios in this way is valuable to understanding how changes in manure nitrogen content or changes in other inputs can alter sidedress nitrogen recommendations. Adapt-N can be used as a tool to increase knowledge of how specific management practices and weather effects nitrogen recommendations for individual fields.

5) Soil organic matter content

Obtaining an accurate estimate of soil organic matter content for a field is difficult. Both the SSURGO database and loss on ignition method used to measure soil organic matter content are known to provide results that can be different from the content in the field. NutrientStar evaluations of Adapt-N trials in North Carolina were affected by the soil organic matter content. We recommend users of Adapt-N carefully evaluate how their inputs of soil organic matter content change sidedress nitrogen recommendations on their fields.

6) Time of sidedress application

Waiting as late as possible to sidedress nitrogen should increase the performance of Adapt-N because the longer you wait the lower the odds of rainfall events causing loss of nitrogen. Instructions in the Adapt-N manual (Mobius-Clune et al., 2016) recommend sidedressing between the V6 and V12 growth stage for best results. However, most farmers sidedress between the V2 and V6 stage of growth. Delaying sidedressing until after the V6 stage of growth is viewed as too risky by many farmers.

NutrientStar scientists analyzed data reported by the developers of Adapt-N (Sela, et al., 2016, Supplementary tables S1 and S2) in a paper published in the *Agronomy Journal*. The data showed that across 113 field-scale trials there was no difference in return to nitrogen when sidedressing occurred at the V4 and V5 growth stages compared with sidedressing between the V6 and V12 growth stages. This result reflects the fact that the time between corn growth stages is typically 3 days per stage, and the probability of a rainfall event with sufficient rain to cause substantial losses of N occurring in the 6- to 12-day period required for corn to move from the V2 or V4 stage to the V6 stage at this time of year is small.

Quotes from experienced Adapt-N users:

“We run [Adapt-N] for YDrop and late season applications to check mineralization estimates up to that point.”

“Having a loss model to back up your own estimate is a useful tool. There is a need to check and possibly apply additional N after a 4” rain. It can also be used to train farmers about losses to encourage them to move toward other practices. So much weather happens two weeks after emergence - by making a rate decision on one day, you’re rolling the dice.”

“I saved \$37,000 dollars in 2013 due to preventive planting because of Adapt N. So the point is everybody uses it in different ways.”

References

Anonymous, 2015. Expected yield. Adapt-N web site. <https://agronomic.zendesk.com/hc/en-us/articles/203635774-Expected-Yield>.

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