

360 SOILSCAN™ GUIDANCE



- + Remember that this is a decision-making process
- + Consistency and accuracy are critical- sampling is the hard part
- + More error occurs during in sampling procedure than in measurement
- + VR or Flat Rate? VR requires higher fidelity of data, which means more samples

+ WHERE TO SAMPLE

How was your N applied?

- + Banded
 - Requires more intense sampling across the row
 - Use sampling board for consistency
- + Broadcast
 - N distribution should be more uniform, so sampling across the row is less intense
 - Still want a complete picture of the profile

Figures 1 and 2 show a schematic of minimum expectations. Keep in mind that the greater the sample number the better the confidence in the results.

Be sure to sample across the row where N was banded (Figure 3). Because N is concentrated in zones (as shown in the Figure 4), we need a representative sample. Blend all the cores across the row into a single sample.

+ WHEN TO SAMPLE

It is good practice to sample one or two locations as often as bi-weekly so you can generate a "nitrate map" that shows patterns and trends. To optimize accuracy, sample as close to the time of application as possible. The biggest benefit of the 360 SOILSCAN machine is that it provides immediate information.

+ HOW MANY SAMPLES

Having more sample locations reduces the chance of an outlier influencing the sampling results and allows for a better understanding of field variability. At minimum we would recommend sampling at least twice within each zone in your field to better understand the areas of high productivity and low productivity. If you are going to VR your N, then each management zone should be tested more thoroughly. It is always better to have more samples per zone.

+ HOW TO SAMPLE

Remember, we are trying to find out what is available to the plants in the rooting zone and the current form of N.

- + Most often, we would recommend a 12" sample, but in order to measure deeper nitrates, a 12-24" core can be pulled from the same hole.
- + Variables:
 - How long ago did you apply the N?
 - What has the weather been like since you applied?If N was applied a short time ago and conditions have been dry, a shallow sample (within the top 6") should be adequate as the N is less likely to have traveled deep within the soil. If, however, it has been longer since N was applied and conditions have been wet, a deeper sampling depth, around 12", is recommended.
- + Make sure to break up the soil as much as possible. This ensures thorough mixing and extraction of NO₃⁻ from the sample.
- + Run the samples as soon as possible. If you must wait to run the samples, get the samples on ice or in a freezer as quickly as possible.



Figure 1

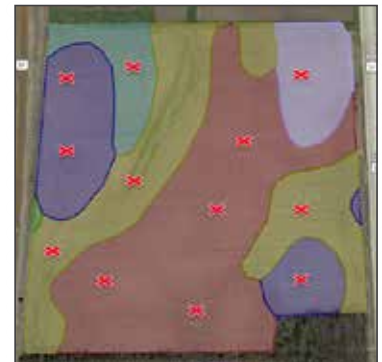


Figure 2



Figure 3

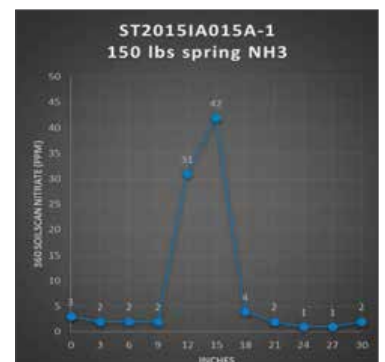


Figure 4

Source: Iowa Soybean Association, Farm Network Testing, Spring 2015

360 SOILSCAN™ GUIDANCE (continued)

⊕ INTERPRETING THE RESULTS

This is where the art combines with the science. Understand that we are testing NO₃⁻ but we also need to know how much NH₄⁺ may be present because 360 SOILSCAN only tests for nitrates. The conversion of nitrogen is a biological process, therefore temperature, moisture, oxygen, pH, residue, etc. can all impact the results.

In order to interpret the data we need to understand the following steps:

1. How much ammonium N may be left
2. How much more N to apply - Utilize the N Needs Calculator App as a guideline to help decide

Use the following chart to understand how much nitrate has converted and how much ammonium could remain.

For example - using the chart below, if I applied 100 lbs of N via 28% two weeks ago, around 70 lbs should be in the nitrate form, because 100 lbs x 70% conversion rate = 70lbs. That means 30lbs remain in the ammonium form. That is important to know because the N Needs Calculator app does not account for the ammonium N when it makes a recommendation, therefore you need to account for it in your recommendation.

Form of Nitrogen	Time of Application	4 Weeks or Longer	2 Weeks
		Estimate % in Nitrate Form	
Anhydrous ammonia	Fall	90	
Anhydrous ammonia with inhibitor	Fall	70	
Anhydrous ammonia	Spring	75	50
Anhydrous ammonia with inhibitor	Spring	60	30
Urea-ammonium nitrate solution	Spring	85	70

(Source: Hoef et al., University of Illinois)

⊕ EXAMPLE

You run a sample 4 weeks after you applied 90 lbs of 28% in a weed and feed (corn-bean rotation).

+ Considerations:

- Since you applied the 28%, you experienced 3.7" of rain in steady rainfall events.
- The weather has been fairly normal with temps in the upper 70s-80s.

+ Explanation (what you should expect to find):

- Because of the rain, sample at 12" depth to make certain you get a representative sample. Because the temperatures have been normal (with decent aeration of the soil profile) assume standard conversion of the ammonium N to nitrate N. So, using the table above, assume about 85% of the total N is in the nitrate form.
- The applied 90lbs x .85 converted means there should be about 77lbs of nitrate found in the soil. If the sample is 12", divide 77 by 3.6* which equals 21.4 ppm. You should expect a 360 SOILSCAN reading of around 21. If the 360 SOILSCAN result is around this number, then move on to the N Needs Calculator; if the result is not around 21, resample.

Use the N Needs Calculator app to calculate the approximate crop needs. Remember, based on the nitrification tables, there is still about 13 lbs of N in the NH₄⁺ form and you will need to subtract that from the N calculator result because 360 SOILSCAN makes the N recommendation using only the NO₃-N number.

If you took multiple depth samples (such as 0-12" and 12-24") we would recommend using the 0-12" sample in the calculator. The deeper samples help you understand where N might be located but for the purposes of calculating crop needs via the 360 SOILSCAN App we suggest only using the 0-12" sample number. Depending on your findings in the 12-24" sample along with your rooting depth and environment, you may want to give credit for a portion of that N (meaning subtract some of it from the estimated N need in the N Needs Calculator App).

*Because you are sampling approximately 3.6 million pounds of soil equivalent in a 12" sample