

BECK'S Soil Nitrate Study - 2013

PLANTED: May 15, 2013
HARVESTED: September 20, 2013
POPULATION: 34,500 seeds/A.
ROWS: Six 30" rows
REPLICATIONS: Two (averaged)

PREVIOUS CROP: Soybeans
TILLAGE: Chisel / Reel Disk
HERBICIDE: Pre: 5 oz. Verdict™
 Post: 24 oz. Durango®
INSECTICIDE: Escalate®
PRODUCT TESTED: BECK 5509A3

RAINFALL	
April	8.80 in.
May	4.15 in.
June	4.30 in.
July	2.60 in.
August	<u>0.40 in.</u>
Total	20.25 in.

PURPOSE:

The basic premise of this study is to determine if soil nitrate test values could be used to measure overall plant available nitrogen and to evaluate how test values compare to various rates of nitrogen applied. Typically, in order to get soil nitrate results, one would have to pull samples from a field location, bag them and then deliver the samples to a professional soil testing lab. This type of testing will be evaluated in this study, but we will also research a new soil nitrate testing device called SoilSens®. SoilSens (Photo 1) is an in-field soil testing device that can measure amounts of plant available nitrate in the soil. The unique aspect of this device is the fact that it can generate nitrate results in less than five minutes, while you are still in the field, after a sample is pulled.

We are using the 2013 CILPFR continuous corn nitrogen rate study for our test site. This gives us the ability to monitor soil nitrate results from 12" soil samples pulled within strips of nitrogen rates consisting of 0 lb. to 250 lbs. of actual nitrogen. Soil nitrates were pulled weekly and average test results were recorded.

Lbs. of Nitrogen	Percent Moisture	Bushels [†] Per Acre	Cost of Nitrogen	Gross [^] Return	Lab NO3 Test Lbs./A.	SoilSens® Test Lbs./A.
0	30.5	124.5	0	\$672.30	8.2	6.4
125	28.2	172.1	\$81.25	\$848.09	16.1	12.2
150	27.7	206.1	\$97.50	\$1,015.44	21.7	19.5
175	28.7	228.2	\$113.75	\$1,118.53	24.2	28.8
200	28.5	236.0	\$130.00	\$1,144.40	35.8	28.4
225	28.4	241.4	\$146.25	\$1,157.31	40.0	35.2
250	<u>28.9</u>	<u>237.1</u>	<u>\$162.50</u>	<u>\$1,117.84</u>	<u>45.9</u>	<u>48.7</u>
AVERAGE	28.7	206.5	\$104.50	\$1,010.60	27.4	25.6

Table 1.

SOILSENS® RECOMMENDATIONS	
SoilSens Lbs./A.	Soil Nitrate Level
0 - 20	Low
20 - 40	Medium
40 - 60	High
60 & Over	Excess

[†]Bushels per acre corrected to 15% moisture.
[^]Gross return is based on \$5.40/Bu. corn and \$0.65/lb. nitrogen.
 Verdict is a trademark of BASF. Durango is a registered trademark of Dow AgroSciences LLC. SoilSens is a registered trademark of Redshield Technology, Inc.

Table 2.

LAB SETTING RECOMMENDATIONS	
Soil NO3 Lbs./A.	Interpretation Guideline
0 - 20	Very likely nitrogen deficiency, sidedress nitrogen recommended
20 - 24	Possible nitrogen deficiency, low rate of sidedress needed
25 - 30	Sufficient nitrogen available, sidedress usually not recommended
30 - 50	Sidedress not recommended
50 & Over	Excessive nitrogen, could indicate excessive applications of nitrogen



BECK'S Soil Nitrate Study - Continued

Table 3.

Was Soil Nitrate Test Result Accurate with EONR?								
Testing Method	0 Lb.	125 Lbs.	150 Lbs.	175 Lbs.	200 Lbs.	225 Lbs.	250 Lbs.	Success Rate
SoilSens NO3	Yes	Yes	Yes	Yes	Yes	No	Yes	86%
Lab NO3	Yes	Yes	Yes	Yes	No	Yes	Yes	86%

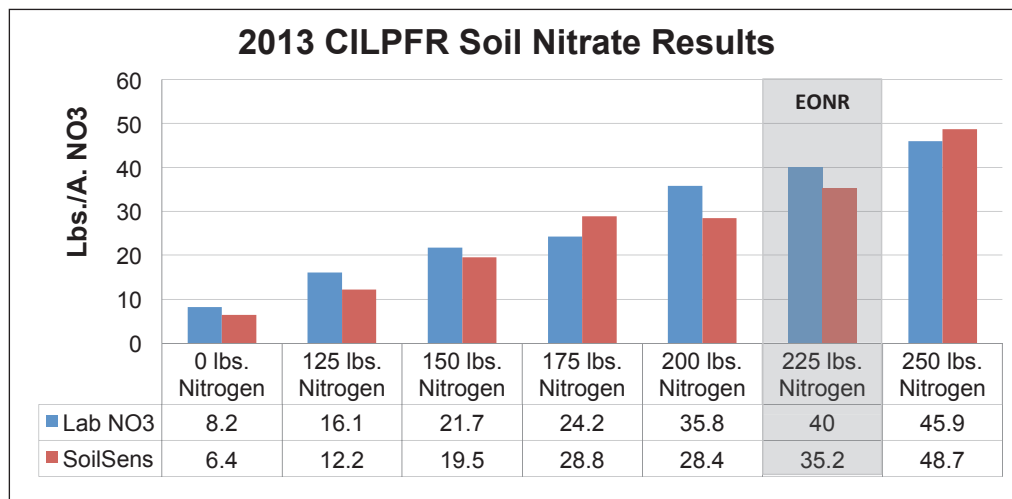


Figure 1.

SUMMARY:

Both nitrate test types showed very similar correlation in the fact that higher nitrogen rates showed higher soil nitrate values. The SoilSens result values did tend to show lower readings by 1.8 lbs./A. on average compared to lab nitrate testing. Tables 1 - 2 illustrate the suggested recommendations by either the SoilSens manufacturer or the by the professional soil testing lab that conducted the nitrate testing. SoilSens suggests that in most cases, 40 lbs./A. of soil nitrate levels should be sufficient levels of nitrogen for plant growth (Table 1). The soil nitrate testing lab's guideline for sufficient nitrate is 30 lbs./A. (Table 2).

By using the CILPFR Continuous Corn Nitrogen Rate Study, we found the Economic Optimum Nitrogen Rate (EONR) to be 225 lbs./A. At this 225 lbs., applying additional nitrogen did not increase enough yield to pay for the extra nitrogen. If we use this 225 lbs. EONR rate as a guideline, we can then evaluate each soil nitrate test result and find its success rate of depicting adequate nitrogen needs. Table 3 illustrates the success rate for both the SoilSens and lab NO3 tests. Both tests were very accurate at applied nitrogen rates that were 175 lbs./A. and lower. However, at 200 - 225 lbs. nitrogen rates, we saw discrepancies with both test types. At the high rate of 250 lbs./A., both tests were accurate in predicting nitrogen needs. Overall, each nitrate test sustained success rates of 86% accuracy.



Photo 1. SoilSens® nitrate test device.