

Evaluating Mineralizable N as a Function of Corn Yield

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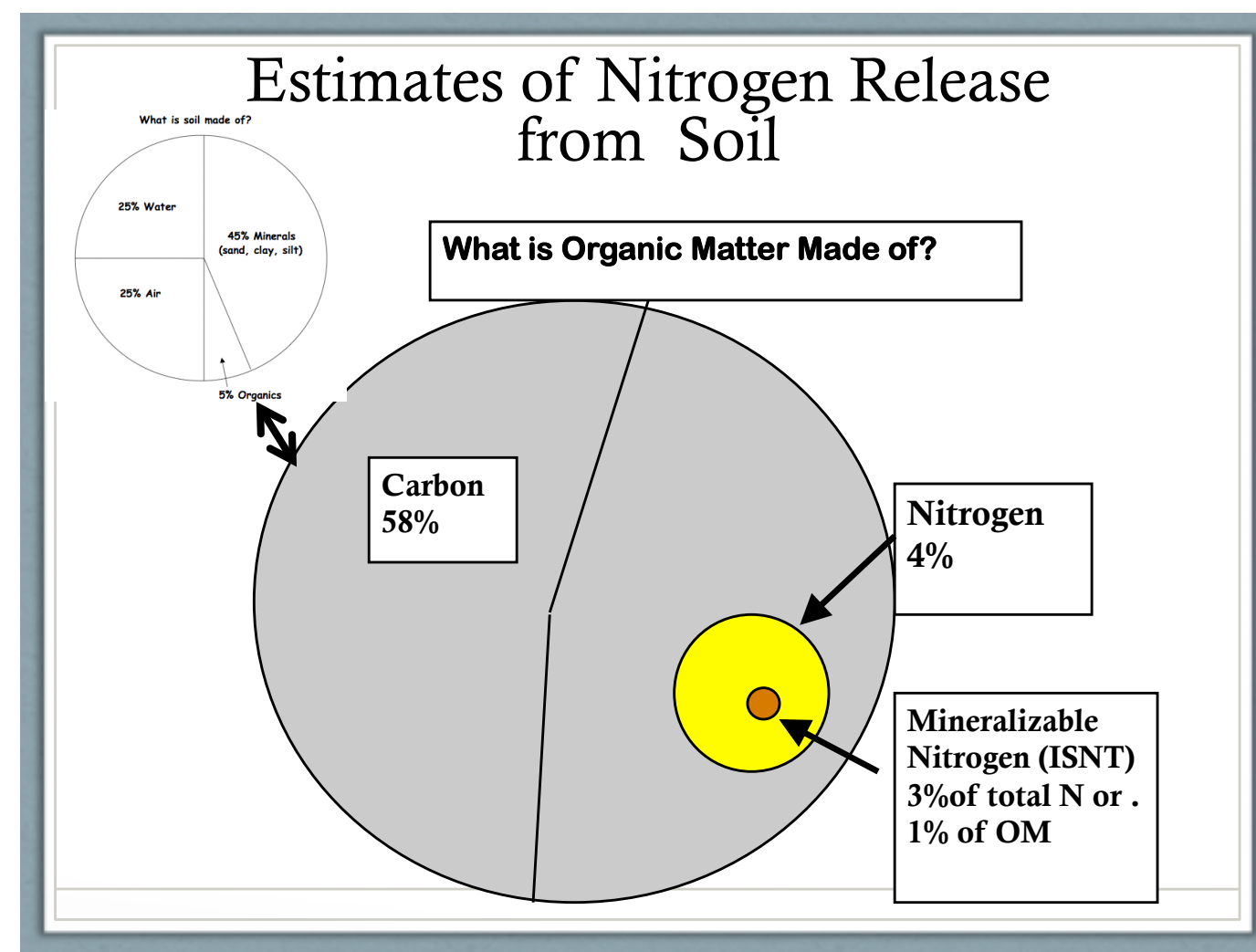


Abstract

Efficient nitrogen use is a fundamental management skill in corn production. While application of nitrogen through commercial fertilizers and manure plays an important role in final crop yield, the forward thinking manager must consider what nutrients come from the soil through the natural process of mineralization. Using the Illinois Soil Nitrogen Test (ISNT) as the basis for measuring the mineralization capability of the soil, we analyzed mineralizable N, applied N and crop yield, on a number of nitrogen rate studies and production fields in Illinois with the goal of determining the role of mineralization as a factor in the overall nitrogen available to the crop. Our data show the correlation between ISNT to crop yield. Based on these data a farmer can more efficiently use applied nitrogen in crop production by considering mineralizable nitrogen as a major source of N nutrition in corn production.

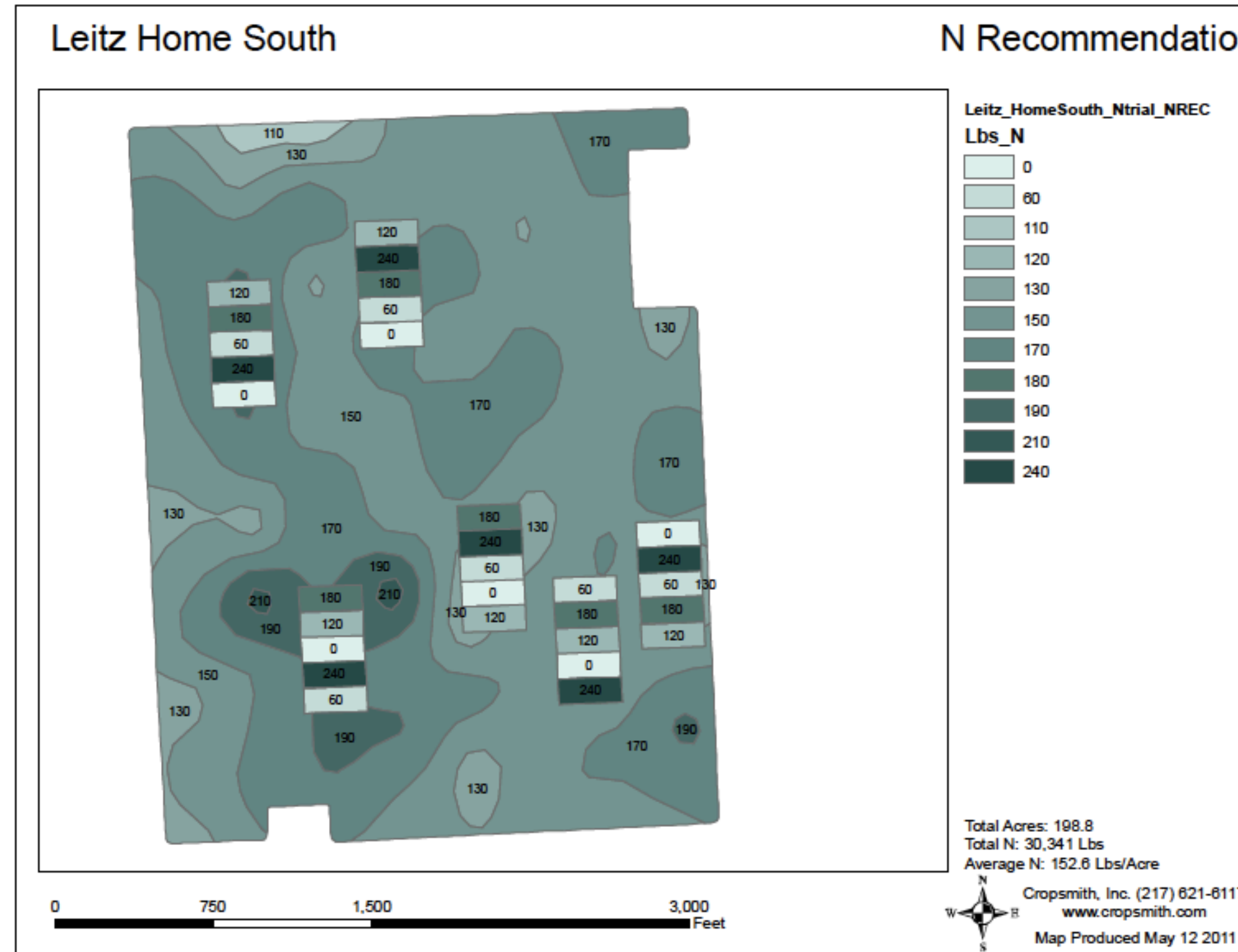
What is Illinois Soil Nitrogen Test (ISNT)?

It is a soil test that measures labile soil compounds that are readily mineralized such as Amino Sugar that are present in soil as a result of microbial activity.¹



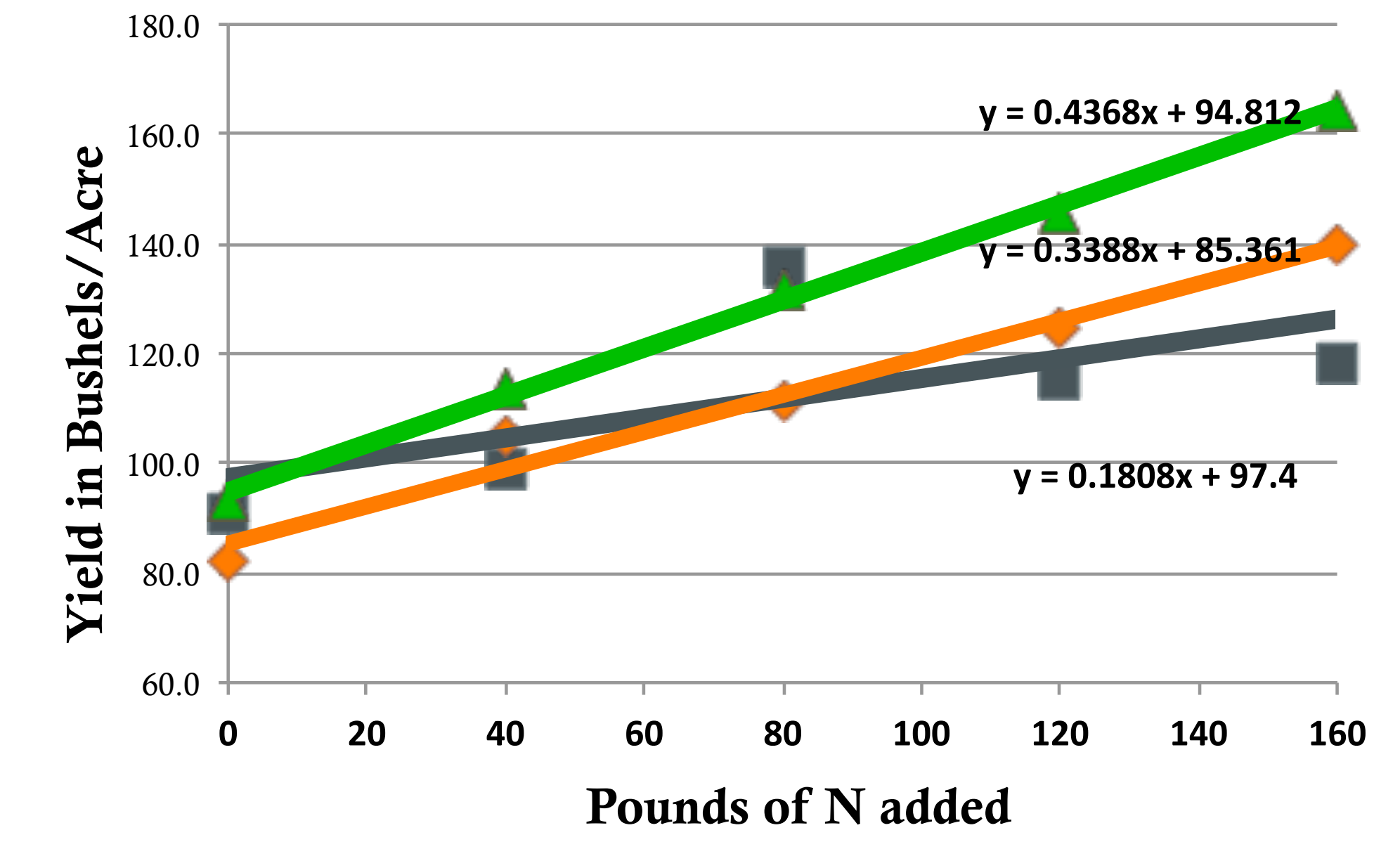
Nitrogen Recommendations Based on ISNT

Rates are prescribed to different areas of the field based on a large database of N response trials that show optimum economic N at different levels of ISNT. This data base is grouped by soil regions and crop rotations. Plots are established in ISNT regions to evaluate actual response to N.



Response to N by ISNT Levels

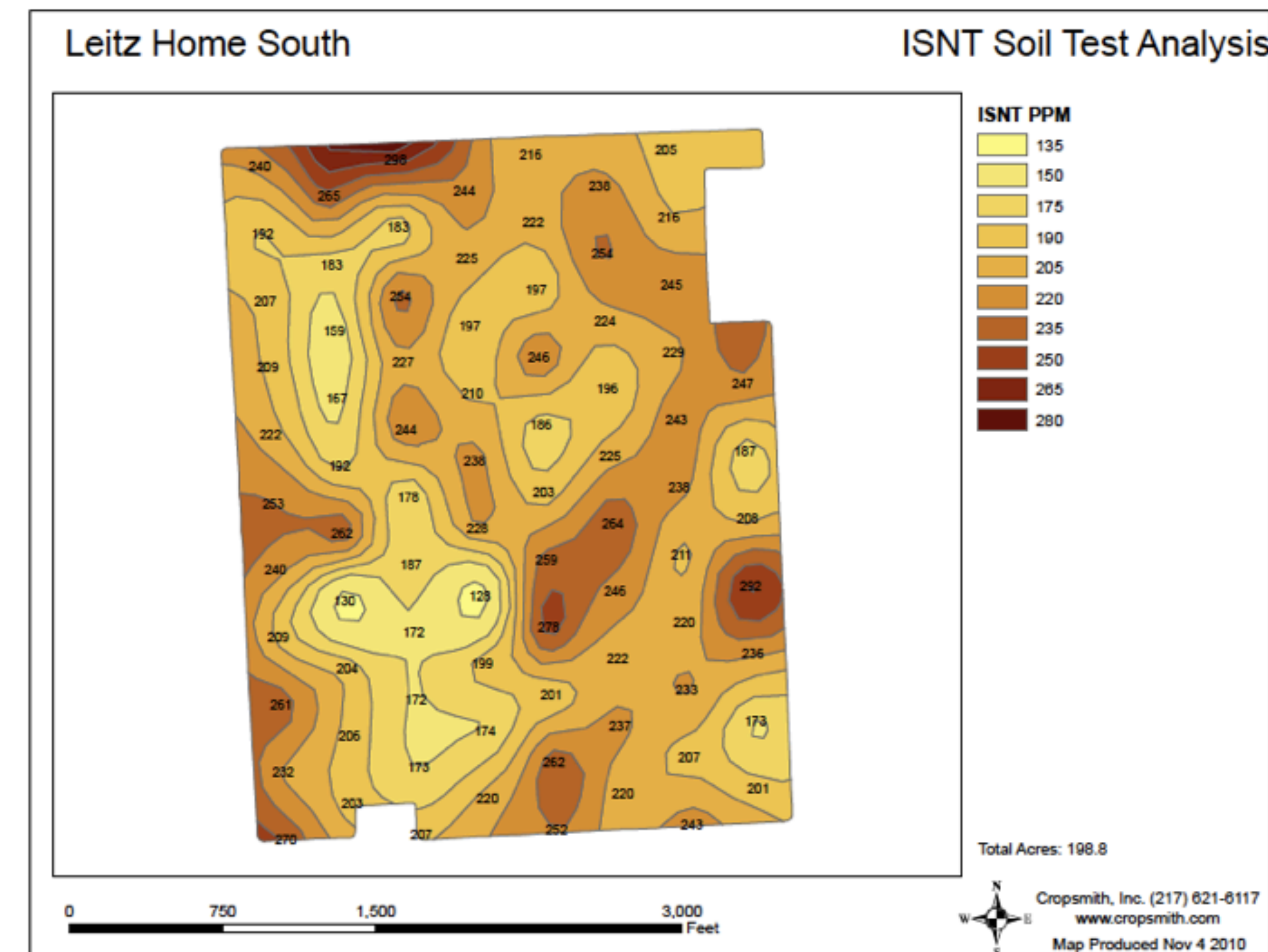
Using the data from the nitrogen plots to determine response. The data had a linear response to N in 2011. You can see the difference in return to each dollar spent on N. Low ISNT soils tend to have higher response to fertilizer N applications while soils with higher ISNT values tend to have higher yields under low N application.



ISNT	N	Corn	Ratio	
	\$0.45	\$3.50	7.8	
75-130 PPM	low ISNT	0.4368	\$1	\$3.44
131-190 PPM	Med ISNT	0.3388	\$1	\$2.60
191-220 PPM	High ISNT	0.1808	\$1	\$1.39

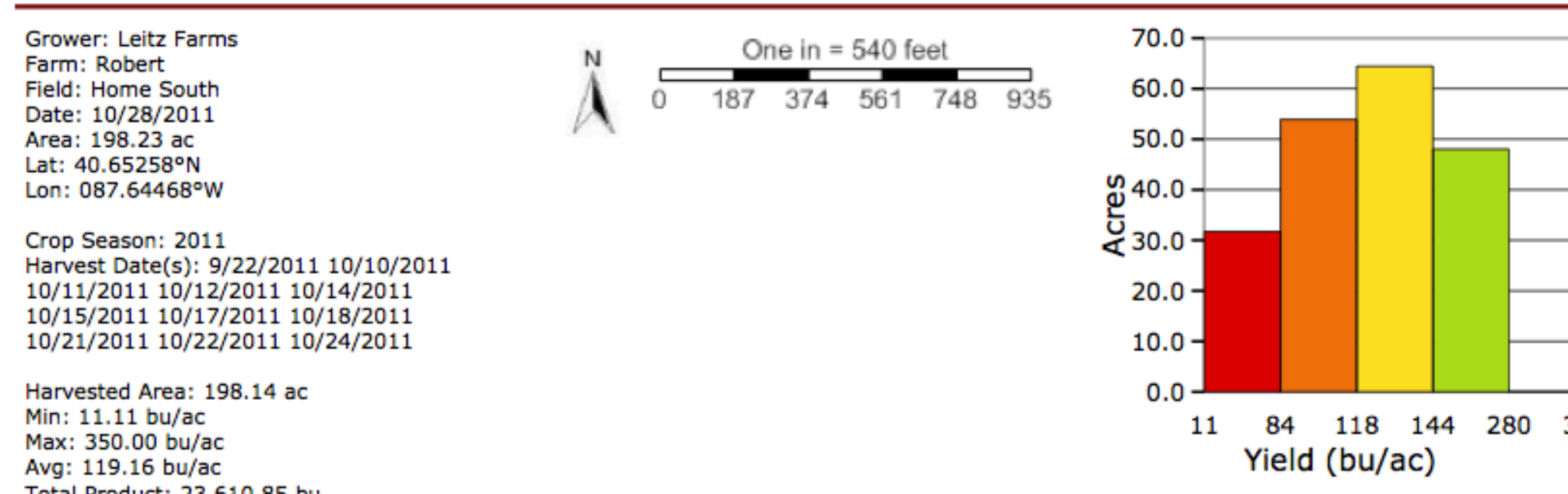
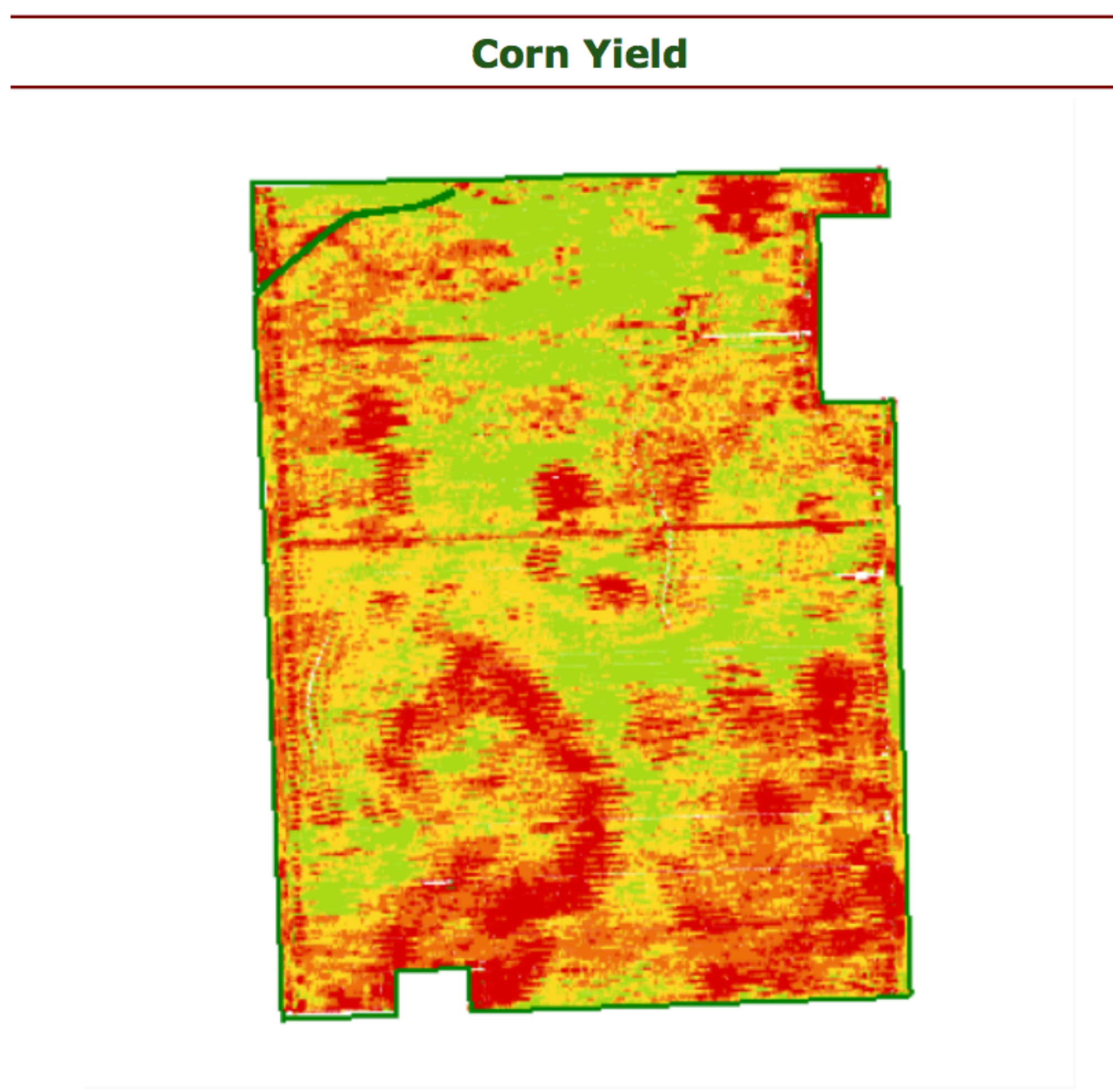
Map of ISNT

Composite Soil Samples Collected to 12 inch depth on a 2.5 acre grid pattern. Soils are tested using the ISNT procedure.²



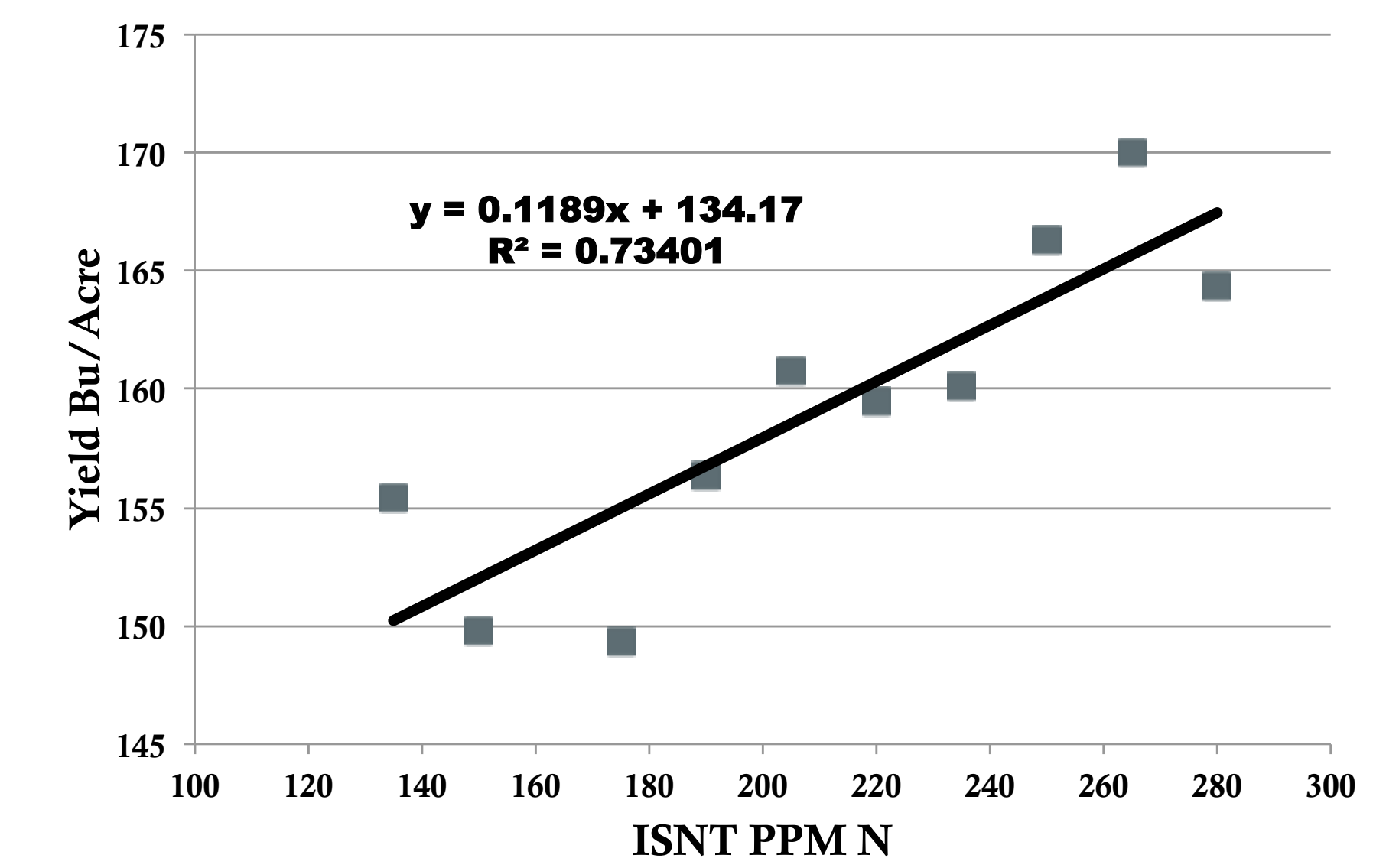
Resulting Yield Data

Yield monitor data is collected, cleaned and sorted to determine actual response to N rates and yield at differing levels of ISNT.

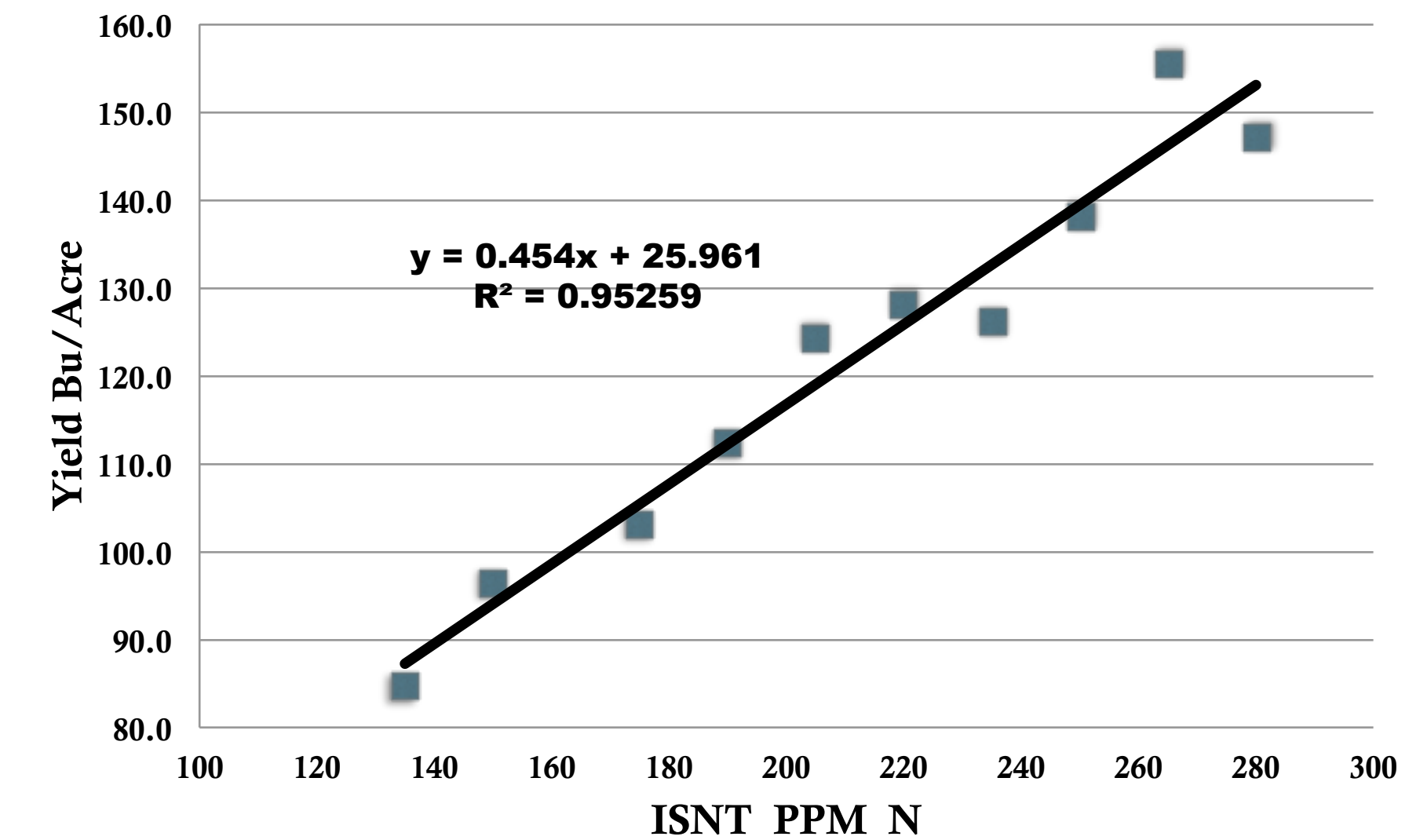


Using the yield monitor data from two different years you can see that there is a very strong relationship between the average yield in an area of the field and average ISNT value of that area.

Field Average Corn Yield 2009 by ISNT



Field Average Corn Yield 2011 by ISNT



Conclusions

The data from this field is typical of what we see in response trials by ISNT zone.

ISNT is a tool for assessing the potential mineralizable contribution of N from the soil. Knowing the potential soil contribution of nutrients can be an important part in making other management decisions, such as N rate and timing and plant populations.

1.. HY Kwon, RJM Hudson, RL Mulvaney

Characterization of the organic nitrogen fraction determined by the Illinois soil nitrogen test. Soil Science Society of America Journal 73 (3), 1033-1043

2. Technical Note 02-01. rev.g. <http://illinoissoiltest.nres.uiuc.edu/~files/papers/TN02-01g.pdf>

3. R. L. Mulvaney, S. A. Khan, and T. R. Ellsworth

Need for a Soil-Based Approach in Managing Nitrogen Fertilizers for Profitable Corn Production. Soil Sci Soc Am J 2006 70: 172-182.