

Soil Quick Test for Improved Precision of N Fertilization

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Overview and Objectives

- In-season monitoring of crop and soil nitrogen (N) status can improve decisions about N fertilizer management and thereby improve the yield, protein content, fertilizer use efficiency and profitability of spring wheat. Simple, accurate, and cost-effective methods of measuring in-season soil nitrate-N status will provide complementary information to proximal plant sensing tools. Together these in-field tools can deliver site-specific, real-time information about relative crop biomass, real-time N status and the potential future crop demand for fertilizer N.
- This preliminary study evaluates the accuracy of a modified in-field, quick-test procedure as compared to a laboratory KCl extraction to determine soil nitrate-N concentration in real-time. The objective of this work is to simplify soil nitrate quick test procedures presented elsewhere such that the determination of in-season soil nitrate-N can become a more widely used tool to inform N topdress decisions in spring wheat.

Method

- Dry soil samples (0-12" taken at tillering) from 3 spring wheat sites with varying soil texture, SOM content, and pre-plant fertilizer application rates were measured for nitrate-N using a laboratory KCl extraction and the Water Works nitrate quick test strips as depicted here. The nitrate quick test method detailed by Hartz (2011) and Smith (2010) was **modified to use a larger volume of solution, and eliminate calcium chloride and settling time.**

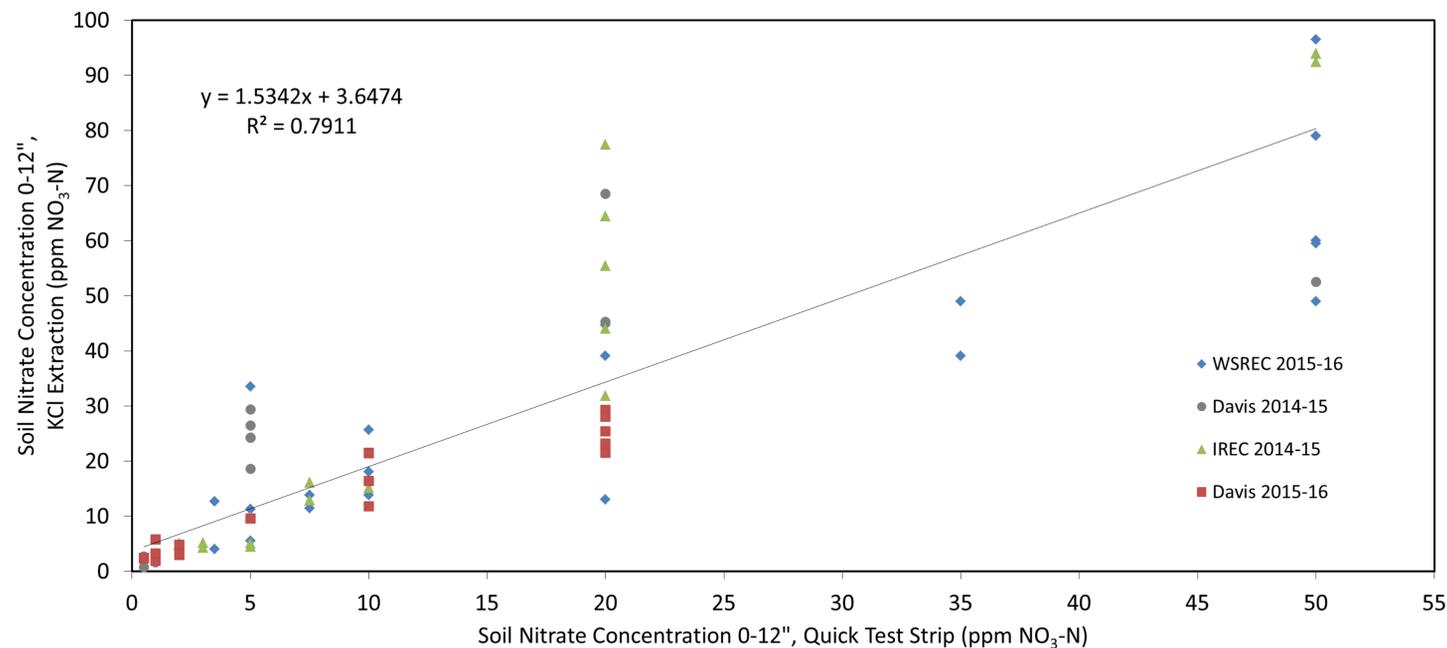
Results & Interpretation

- Preliminary results suggest a positive correlation ($P < 0.01$, $R^2 = 0.79$) between soil nitrate-N estimated by strips using the modified procedure and nitrate-N measured by KCl extraction, where:

$$\text{Strip reading (ppm NO}_3\text{-N)} * 1.53 = \text{ppm NO}_3\text{-N in dry soil}$$

- There was evidence of a location interaction, which may indicate that the correction factor needed to convert the strip reading to a laboratory value may vary based on soil texture and SOM content. However, further testing of a larger sample set is needed to more precisely estimate site-specific correction factors. In addition, all measurements were made on dry soil and a further correction may be necessary for field-moist samples. Nevertheless, for making quick estimates of the real-time soil nitrate-N availability at a given location, the simplified method presented here can provide actionable information to growers and consultants considering a N topdress in spring wheat.

Soil Nitrate at Tillering, 0-12"



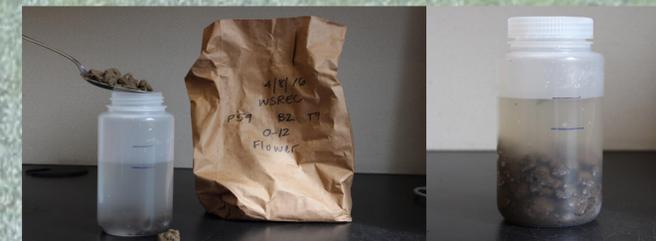
Nitrate Quick Test Strip Method

1 Start with a representative soil sample.

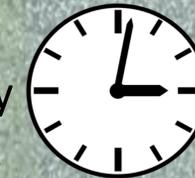
2 Fill a 500 ml Nalgene with 300 ml distilled water.



3 Add soil until water level rises to 400 ml.



4 Shake vigorously for 3 min.



5 Partly dip strip allowing solution to wick.



6 Wait 60 sec; compare to color chart on bottle.



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