

Maize Performance in Relation to Compost Rates & Soil Health Test Factors

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Materials & Methods



- TWO TYPES of compost:
 1. **Biosolids Compost** from Municipal In-Vessel Composting, Aged 3 mos.
 2. **Leaf compost** from Highmoor Farm, aged 1-2 years
 - THREE RATES:

22, 45, 90 Mg ha⁻¹ (wet basis)
(10, 20, 40 ton acre⁻¹)

Total N* Rates: kg/ha

 1. 45, 90, 180
 2. 38, 76, 153
- * Based on compost TN analysis

Overview

- Soils are a challenge in predicting nutrient release. Use of composts adds to challenge since compost application has not been calibrated with soil testing.
- Suite of soil tests used: inorganic-N spring vs. summer, 7day N-min, water-extractable organic carbon (WEOC), WE organic-N (WEON), Solvita CO₂- Burst and Labile-Amino-N (SLAN).
- 2 yr study with split plots year 2; these data cover year one testing
- Two out of 21 plots intersected a sod plow-down.

Soil Properties for Evaluating N-Predictions

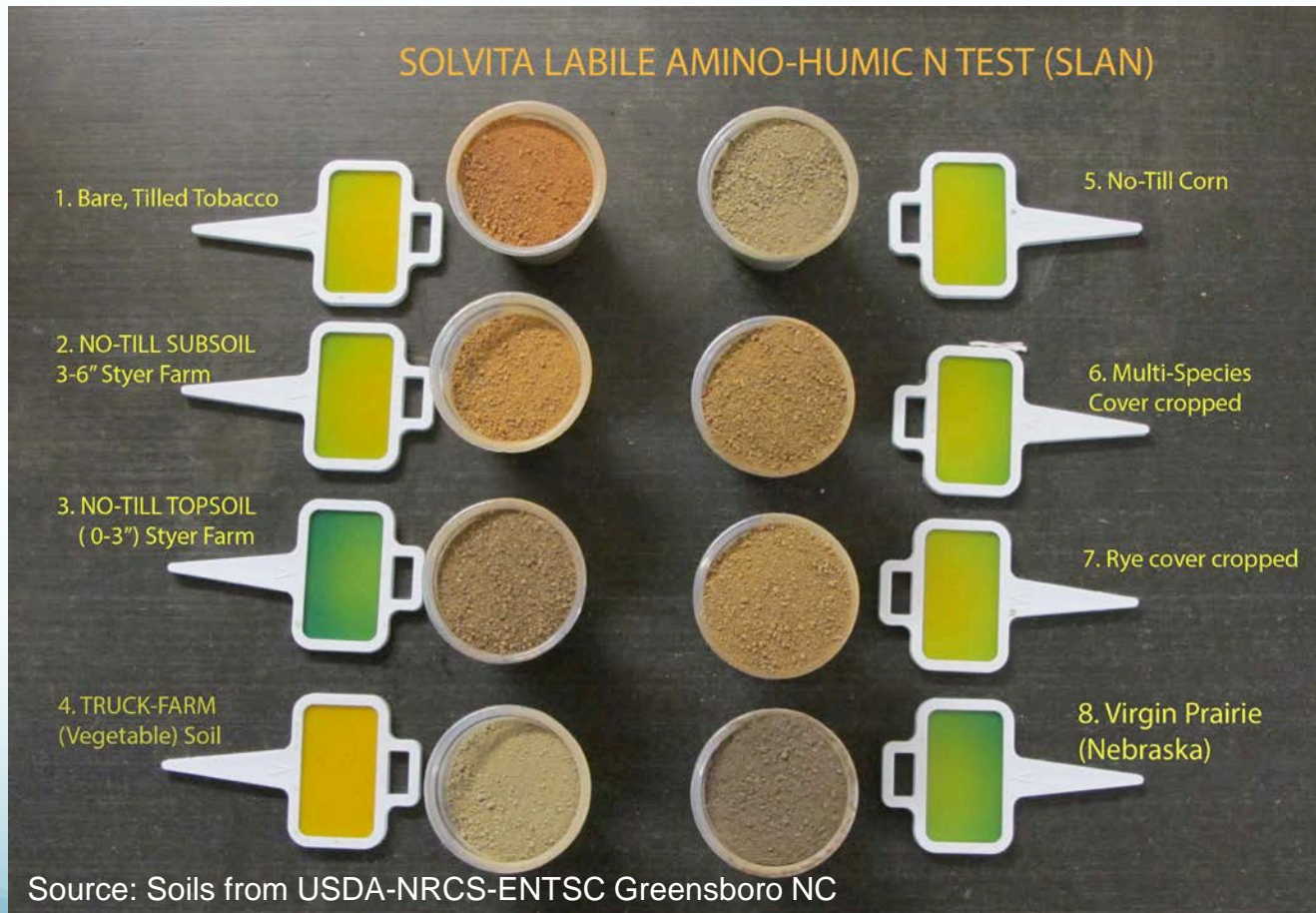
Trait	Block 1	Block 2	Block 3
Water Extractable Organic C, (WEOC) mg/kg	77.5 ± 7.3	81.5 ± 9.8	76.0 ± 14.
Water Extractable Organic N, (WEON) mg/kg	8.2 ± 0.9	8.2 ± 0.8	8.2 ± 0.9
Nitrate-N mg/kg	1.5 ± 0.8	1.5 ± 0.7	1.5 ± 0.8
7day N-min..... mg/kg	26.4 ± 18	19.3 ± 4.8	24.5 ± 10.6
CO ₂ -C Burst, mg/kg	16.3 ± 7.3	14.6 ± 2.8	15.8 ± 2.9
N-min predicted kg/ha §			
(a)	18	16	17
(b)	25	22	23

§ (a) Based on Stoichmetric CO₂-C:N release (www.Solvita.com)

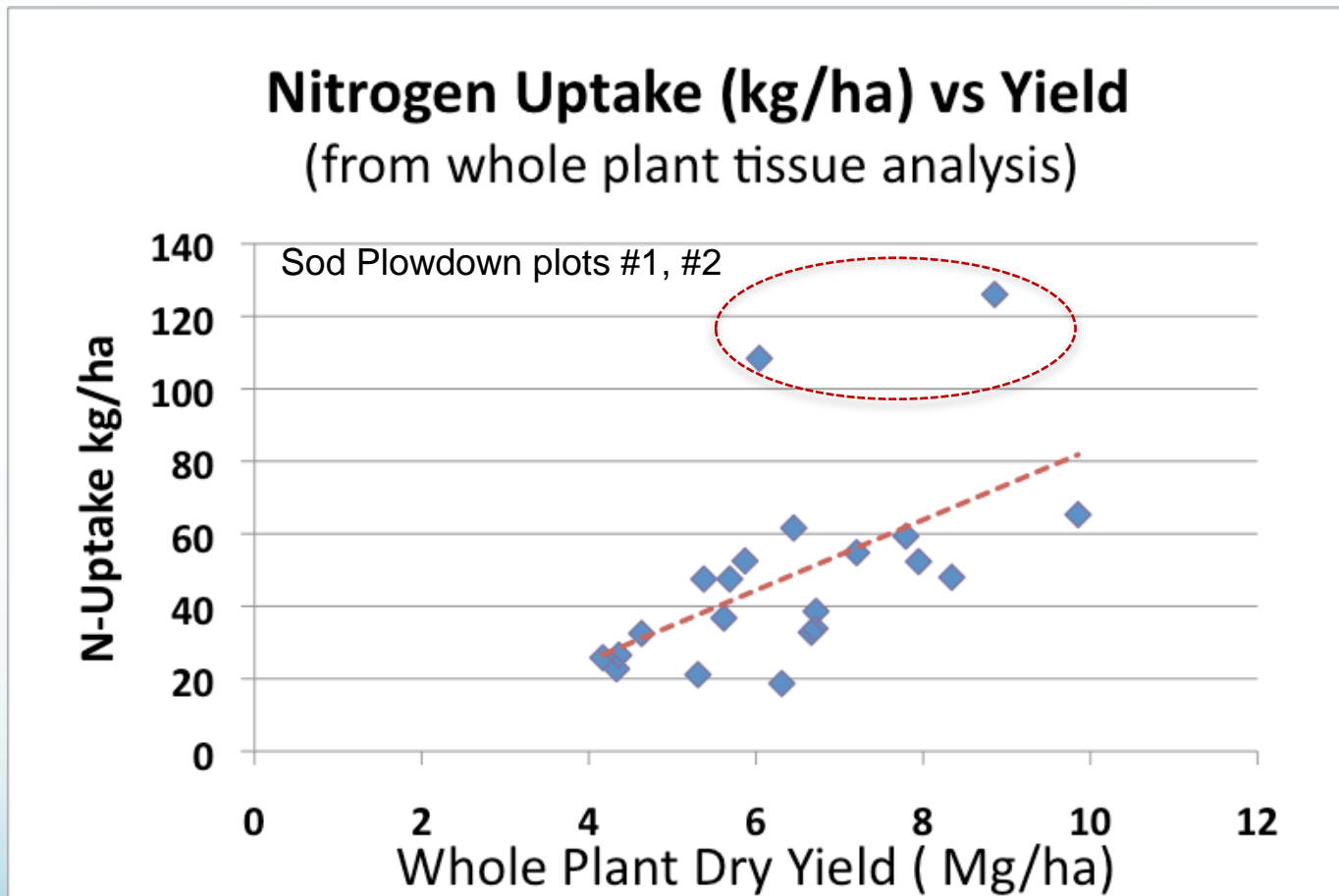
(b) modified after USDA-ARS Soil Health Tool Model (Haney 2013)

What is SLAN?

Soil (4g) + 2N NaOH (10cc); 25°C for 24 hrs.
Solvita® NH₃-Probe used as Sink for NH₃ released.



N-Uptake vs. Corn Plant Yield



Tissue Nitrate at Harvest

Sod effect is luxury N-uptake

TREATMENT	Stalk Tissue Nitrate-N mg/kg TS	St. Dev. (±)
Control Plots	146	85.0
SOD PLOTS	10,300	1,325
LeafComp -10 *	451	606
LeafComp - 20 **	280	54
LeafComp - 40	236	114
Biosolids-10	116	139
Biosolids-20	106	90
Biosolids-40**	143	165

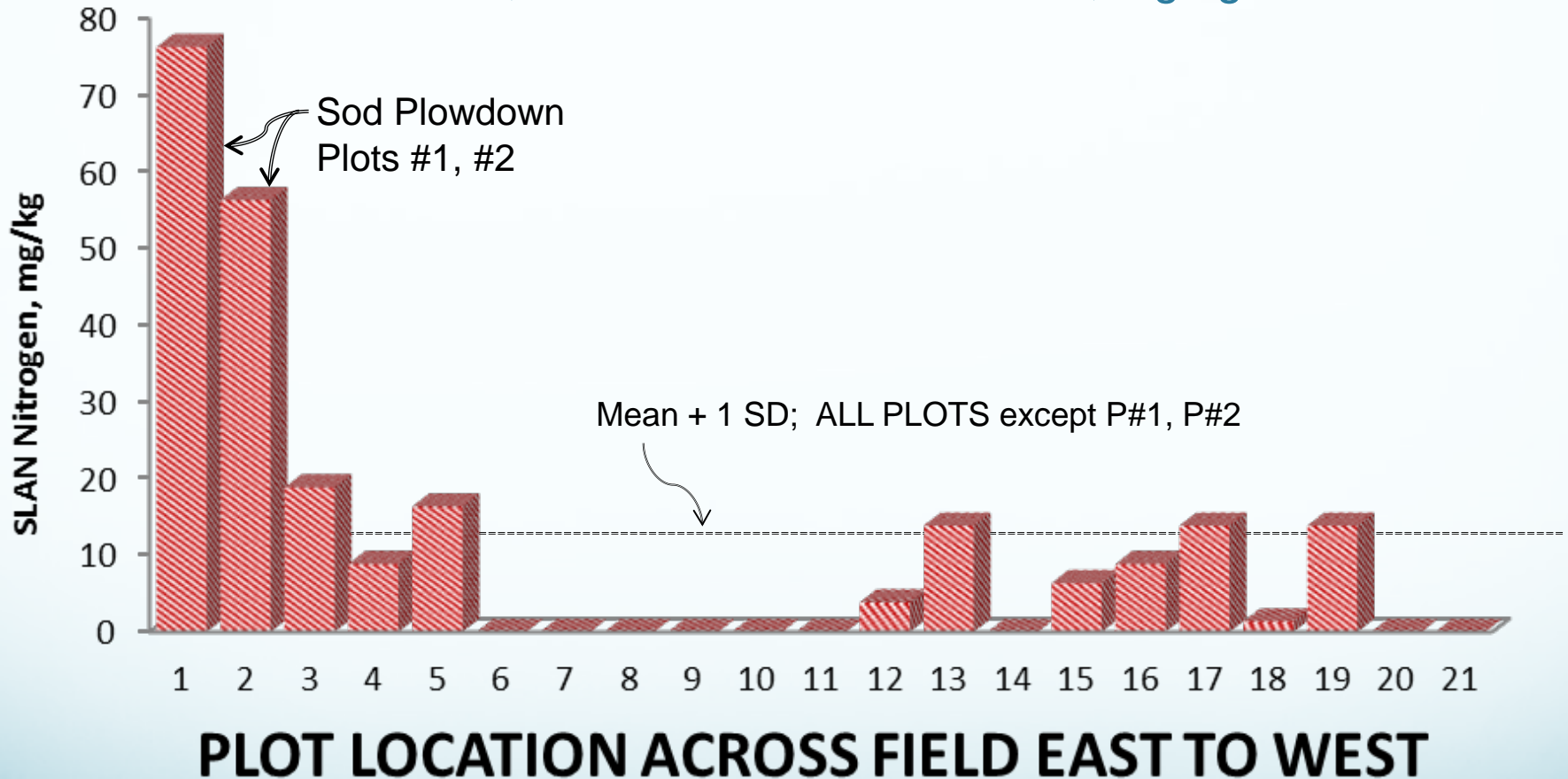
Notes: 10,20, 40 are ton/a rates for 2 types of compost

* one of 3 plots bordered the sod plowdown and is included

** one replicate in sod plow-down zone not included in mean

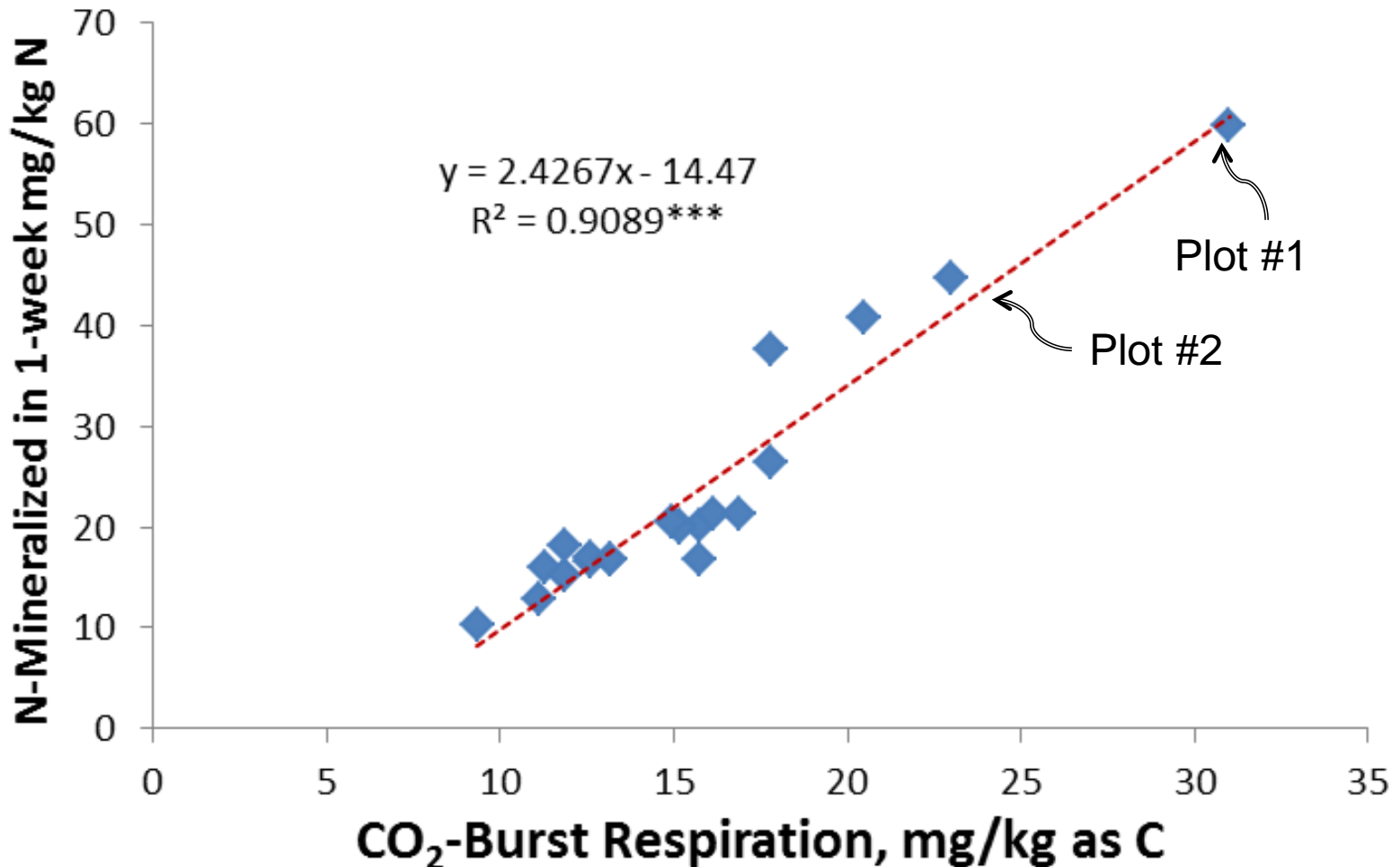
Labile Amino-Nitrogen with Solvita®

in Soil Plots, **Difference from Controls**, mg/kg as N

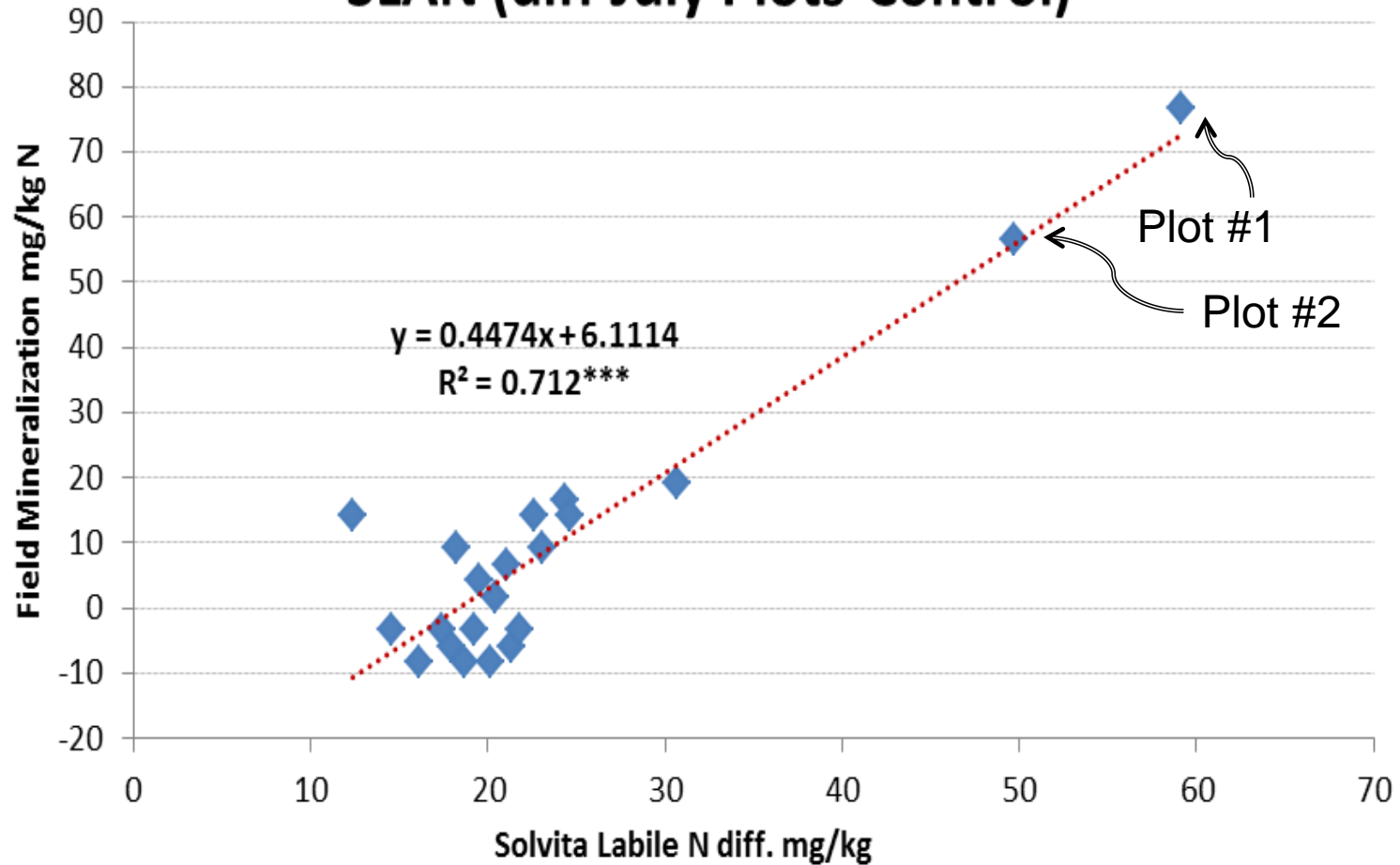


7day N-Min* vs. CO₂-Burst

*Incubated @40C in water for 7 day NH₄ diff is N-Min
July (midsummer)soil samples used



Field N-Mineralization (diff July-April) vs SLAN (diff July Plots-Control)



Summary

- N-mineralization predicted from CO₂-Burst and 7-Day N-min lab tests closely compared to field results of N-uptake in control plots which was 25 kg/ha
- Plowdown of sod in 2 plots resulted in large gains of N to crop with luxury N-uptake evident
- SLAN test for alkali-labile N pool detected much higher NH₂-N in sod plots corresponding to differences in yield and N uptake
- OM turnover and pools of organic N can be assessed for improved prediction of crop N needs.

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Richard L. Haney

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- SLAN Soil Demonstration Samples

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