

Tillage and Soil Moisture Affects On Sensor Based Soil Organic Matter Determination.



Brian Wienhold, USDA-Agricultural Research Service, Lincoln, NE
Gary Varvel, USDA-Agricultural Research Service, Lincoln, NE



Background

Fertilizer N recommendations often include an adjustment for soil organic matter. In most fields SOM varies spatially and methods for determining this variation are needed. Georeferenced sensor based measurements have potential for collecting spatially dense information and reducing the need for soil sampling. Electrical conductivity (ECa) sensors are commercially available and can be used for collecting spatially dense soils data.

Objective

To assess the potential for using ECa and directed soil sampling to determine spatial variation in soil C content.

Methods & Materials

The study was conducted in a farmer cooperator field near York, NE. Soil ECa was measured using a Varis cart (Fig. 1). Soil samples were collected at 20 ECa calibration points and at 20 validation points. Soil C measured at the 20 calibration points was regressed against ECa using ESAP. Resulting equations were used to estimate soil C at the 20 validation points and estimated soil C values were compared to measured values.



Fig. 1

Results

- The calibration of ECa and soil C had a coefficient of determination of 0.68 ($P = 0.001$).
- The calibration equation was used to estimate soil C concentration at the remaining ~8800 ECa sample locations (Fig. 2).
- There was good agreement between estimated soil C concentration and measured soil C concentration at the 20 validation points with a coefficient of determination of 0.70 (Fig. 3).
- The range in soil organic C in this field results in a 7 to 38 kg/ha N adjustment within this field using the Nebraska N fertilizer calculator.

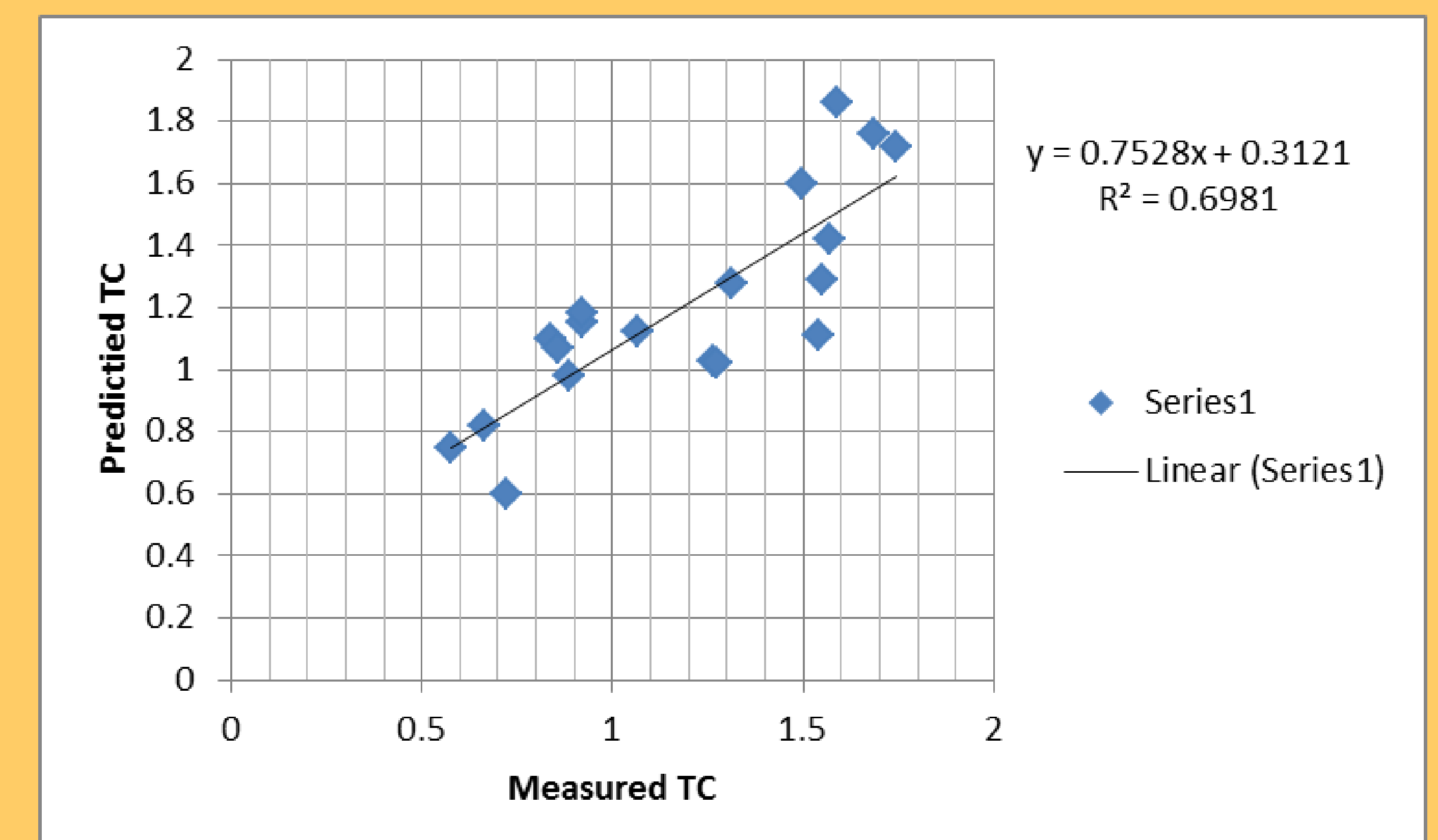


Fig. 3

Conclusion

- Spatial variability in soil organic C was effectively mapped using ECa and directed soil sampling.
- This approach has potential for improving fertilizer recommendation when credits for soil organic matter are included.

Contact

Brian Wienhold, USDA-ARS
116 Keim Hall
Lincoln, NE 68583
402-472-1484
Brian.Wienhold@ars.usda.gov