Using Research & Data to Improve Soil Health

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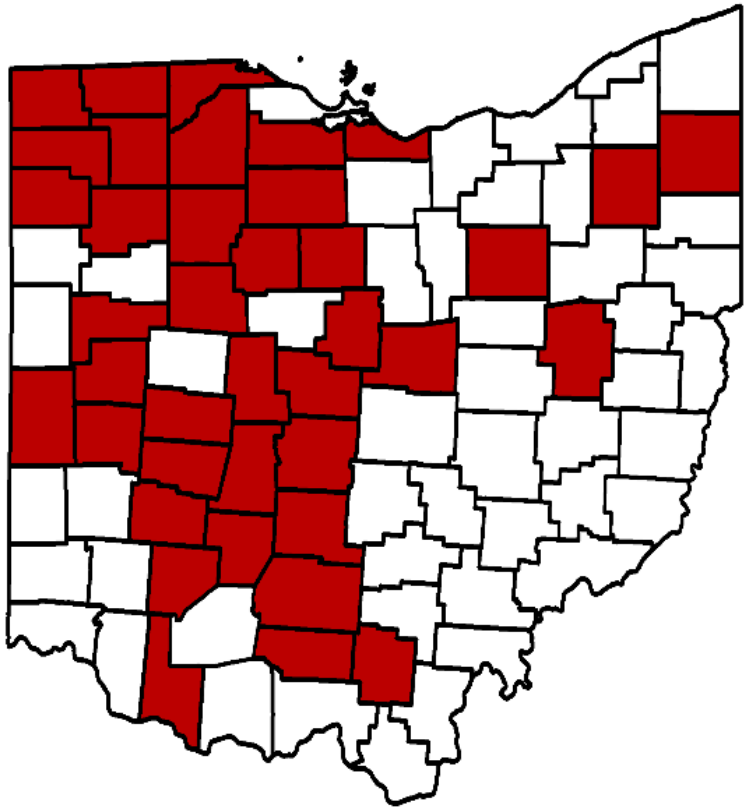
eFields

connecting science to fields

eFields is an Ohio State University program dedicated to advancing production agriculture through the use of field-scale research.



Annual Report

- View and download at: go.osu.edu/eFields
- Request a printed copy at your local Extension office or by emailing digitalag@osu.edu

eFields is driven by farmer questions.

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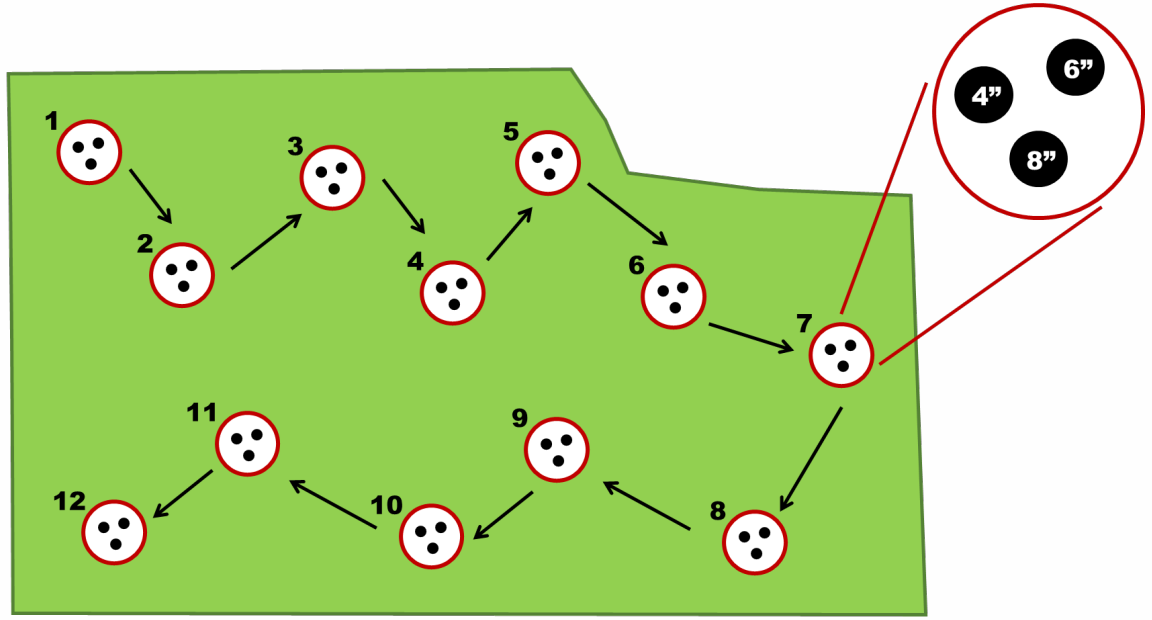
Research Questions

- How does soil type influence soil health values?
- How much does sampling depth matter?
- How do conservation practices impact soil health?
- Help farmers set baselines to track soil health values at the field level
  - What is a good value?
  - How might conservation practices change this?

Sampling Protocol

- Whole field sampling strategy
  - 10-15 cores
- 3 depths collected at each sample point
  - 0-4”
  - 0-6”
  - 0-8”
- Fields were sampled in May-July

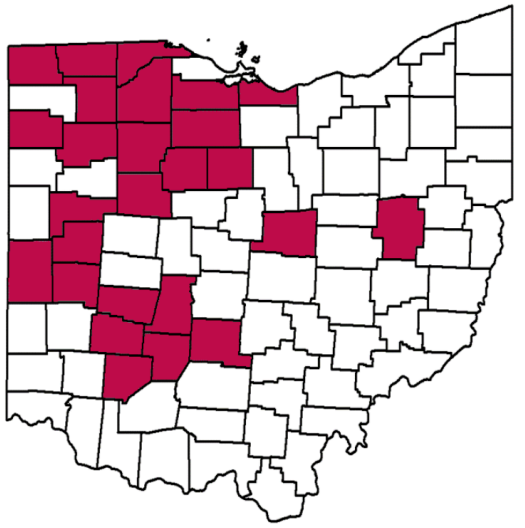


Targeted Management

- Long term no-till
- Conventional tillage
- Cover cropped
- Organic nutrient applications (manure)

Methods

- 88 fields in 26 Counties, 261 soils
- Sampled at 3 depths: 0-4”, 0-6”, 0-8”
- Routine Soil Test
  - pH, organic matter, Mehlich-3 extractable nutrients
- Emerging Soil Health Indicators
  - POXC
  - Aggregate Stability



POXC *(permanganate oxidizable carbon)*

- aka, ‘Active C’ - quick simple test
- Biologically active, small pool of organic matter (<5%)
- Sensitive indicator of management compared to total organic matter
- Represents a microbially-processed pool of C
  - What microbes have eaten
  - Available nutrients, but more likely to stick around

Aggregate Stability

- Stability = soil structure
- Ability of soil to hold together (not slake) when dunked in water
- Nested sieves, but measures macro-aggregates (>250 mm)
- Relates to pore space, gas exchange, water infiltration

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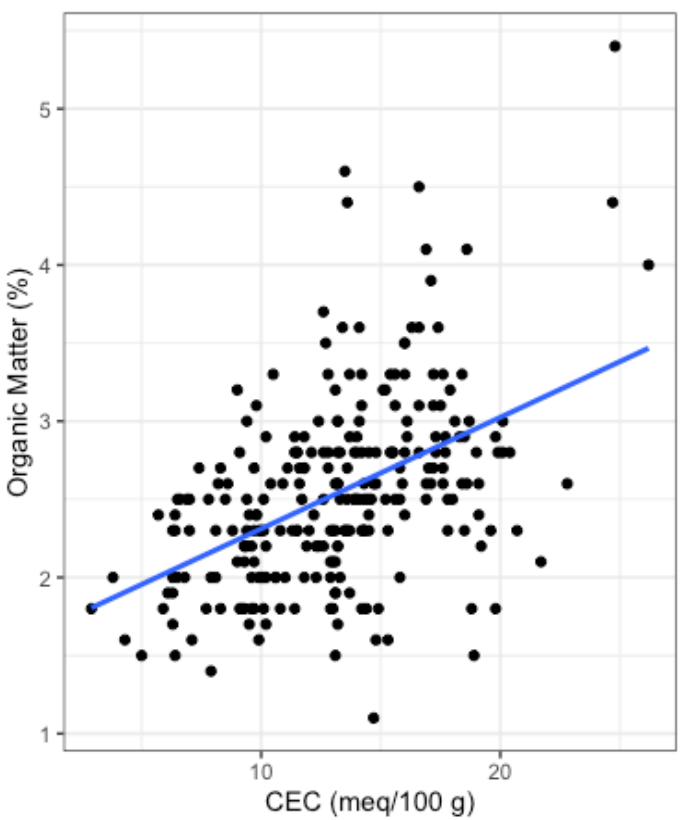
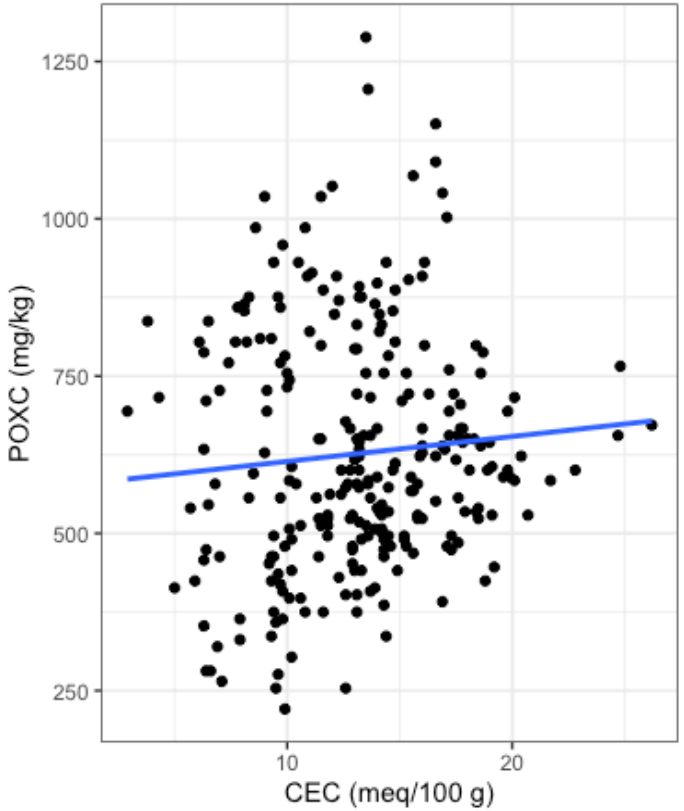
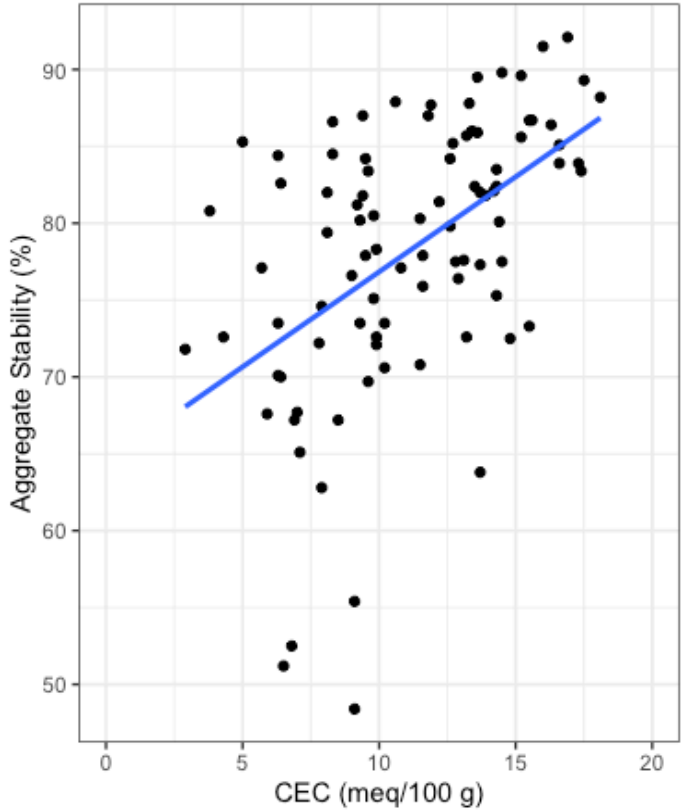
Influence of Soil Type on Soil Health



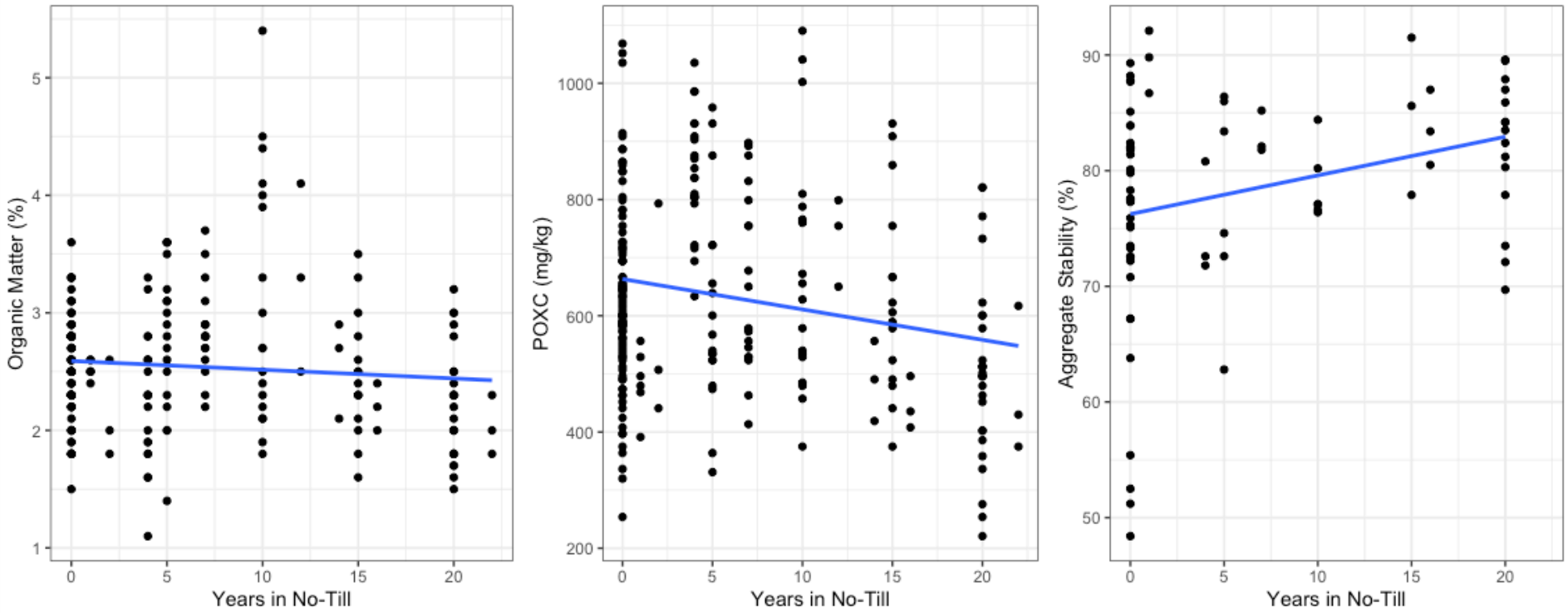




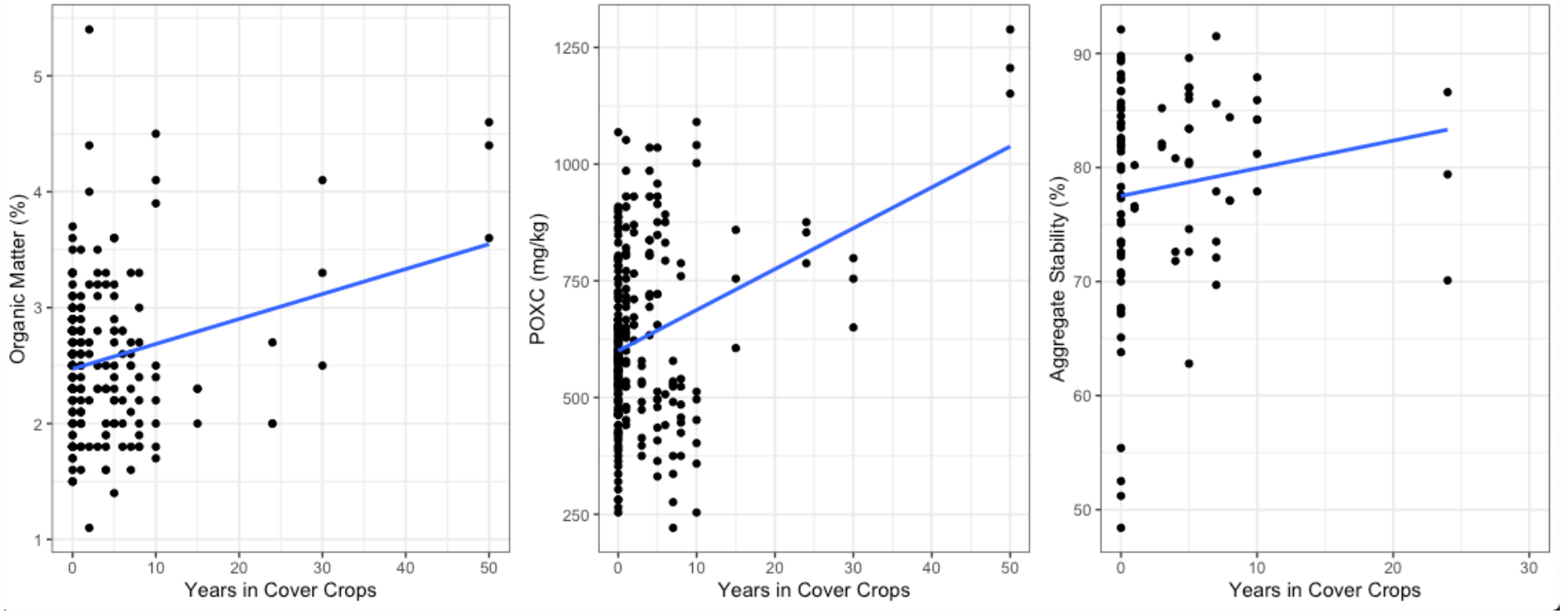
Influence of Depth on Soil Properties

Depth	Soil pH	Organic Matter (%)	P (ppm)	K (ppm)	POXC (mg/kg)	Macro-aggregates (%)	Micro-aggregates (%)
0-4"	6.4	2.7	70	198	678	79	21
0-6"	6.4	2.5	61	181	621	79	21
0-8"	6.4	2.4	54	166	583	77	23

Years in No-Till ==> Soil Health



Years in Cover Crops ==> Soil Health



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Summary

- **Soil type matters**
  - Major influence on soil health properties, need to adjust what a ‘good’ soil health value
  - As CEC increases: Total organic matter, POXC and aggregate stability increase
- **Depth of soil sampling matters**
  - As sampling depth increases, soil values typically decrease
  - Need to sample to consistent depth
- **Management matters**
  - Years in no-till ==> both increase and decreasing soil health values
  - Years in cover crops ==> increases in soil health values
- **Much more work is needed**
  - 261 soil samples from 88 fields, but this dataset is in no way is comprehensive

What's a good soil health value?

POXC	25%	50%	75%	95%
Sands (<6 CEC)	344	406	491	>492
Silt Loams (6-18 CEC)	396	487	580	>600
Clay Loams (18-25 CEC)	401	657	907	>908

Where are we headed?

- **Hope to integrate soil health measurements into eFields moving forward**

- **Help support commercial testing labs to integrate soil health testing into their portfolio of tests offered**

- **Continue to understand how management impacts indicators and how indicators can provide guidance with soil and crop management**

Interested? Get Involved!

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Email us at digitalag@osu.edu

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