

**Optimizing Agricultural Practices: Balancing Manure Use and Minimizing Compaction**

Elzem Ozlu, PhD  
Soil Management Extension  
Specialist and Assistant Professor  
NC State University, Plymouth NC



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**Manure Management in Agriculture**

- Manure type
- Manure handling and application
- Interaction with tillage practices

Analysis	Units	Beef Manure	Dairy Manure
Total N	lb/ton	25.4	15.9
Organic-N	lb/ton	23.1	14.7
Ammonium-N	lb/ton	2.26	1.2
Total Available-N	lb/ton	13.6	7.4
P <sub>2</sub> O <sub>5</sub>	lb/ton	20.4	7.8
K <sub>2</sub> O	lb/ton	31.9	10.5
Moisture	%	35.5	48



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**Improper manure handling/spreading or excessive application can lead to soil compaction**

- Heavy Machinery Traffic during application
- Soil Condition
- High Application Rates
- Improper Timing
- Repeated Applications without Tillage



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**Adequate manure management: can enhance soil resilience to compaction**

- Increase organic matter
- Promotes soil aggregates formation
- Reduced Mechanical Stress
- Reduces bulk density
- Promotes porosity
- Root growth promotion

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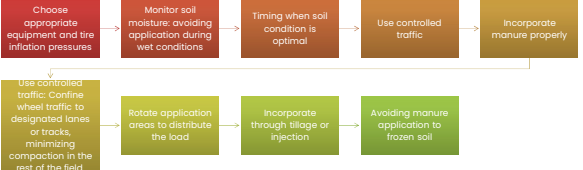
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**Strategies to Minimize Soil Compaction When Applying Manure**



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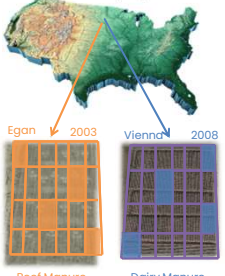
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**How does manure help to optimize soil health and crop yield together?**



Control	Inorganic Fertilizer	Manure
CK: No application of manure or inorganic fertilizer	NF: Soybean: no App. Corn: Only N	PM: Soybean: 10 Mg ha <sup>-1</sup> , Corn: 9 Mg ha <sup>-1</sup>
Urea, Map, Potash, Zinc Sulfate, Ammonium Sulfate	HF: Soybean: no App, Corn: N, P <sub>2</sub> O <sub>5</sub> , K <sub>2</sub> O, Zn, S	NM: Soybean: 30 Mg ha <sup>-1</sup> , Corn: 17 Mg ha <sup>-1</sup>
		HM: Soybean: 61 Mg ha <sup>-1</sup> , Corn: 45 Mg ha <sup>-1</sup>

• Corn (*Zea mays* L.)-Soybean (*Glycine max* L.) rotation.

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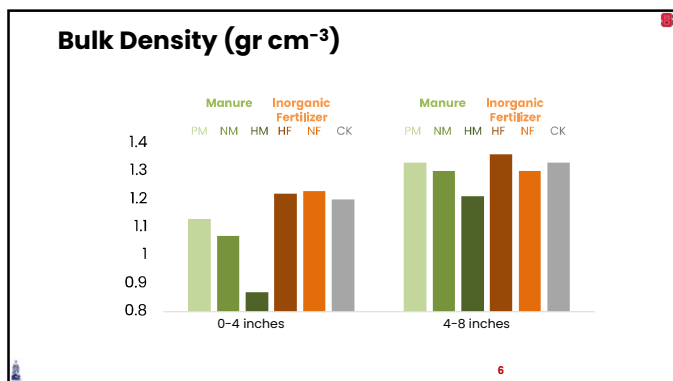
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### Wet Aggregate Stability (%)

Treatments	0-4 inches	4-8 inches
P - Manure	91.90	90.12
N - Manure	93.51	92.28
H - Manure	98.59	92.40
N - Fertilizer	89.22	89.11
H - Fertilizer	87.39	84.55
CK - Control	90.11	90.41

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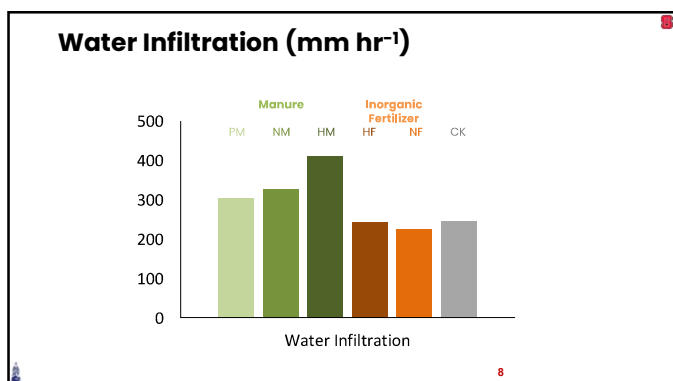
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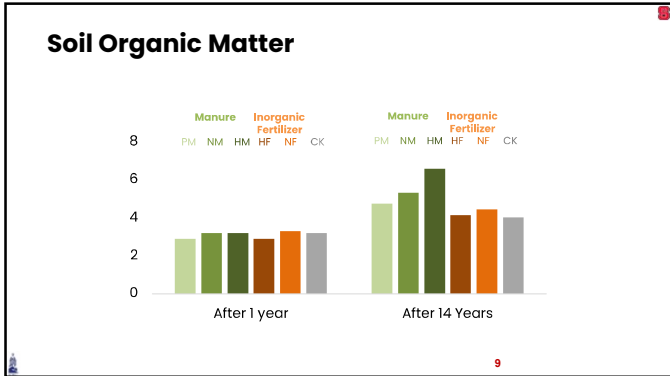
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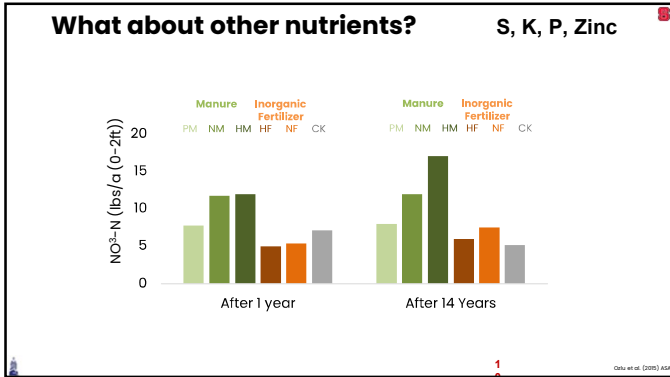
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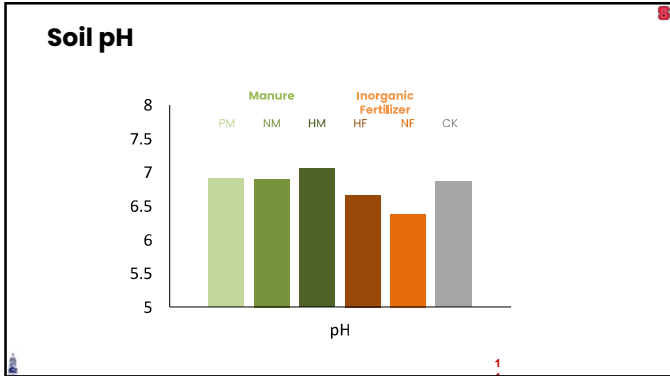
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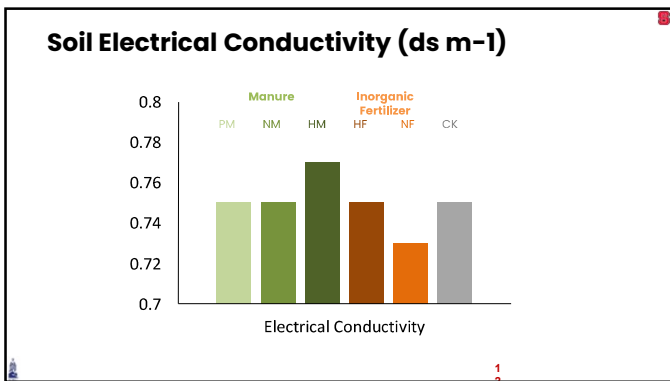
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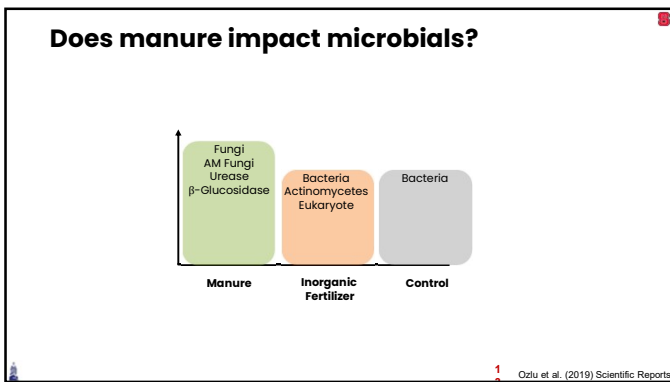
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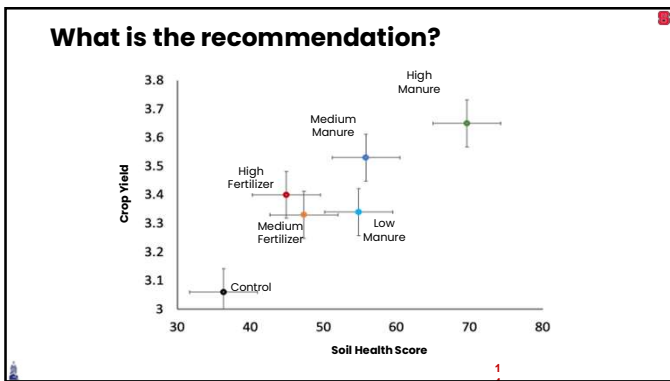
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### Soil Aggregate Re-formation Study in Wisconsin

**Experiment:**

- 12 plots
- 4 replications
- 4 treatments
- Continuous Corn (*Zea mays* L.)

**Treatments:**

- CTNM, chisel tillage no manure
- CTSM, chisel tillage with manure
- NTNM, no-till with no manure
- NTSM, no-till with manure

**Sampling Times:**

- Spr, Before Planting
- Afs, After Planting
- Sum, Mid - Summer
- Bha, Before Harvesting
- Aha, After Harvesting

2015 - 2018

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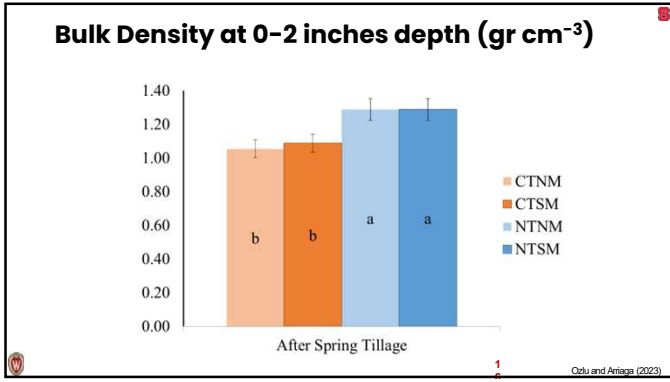
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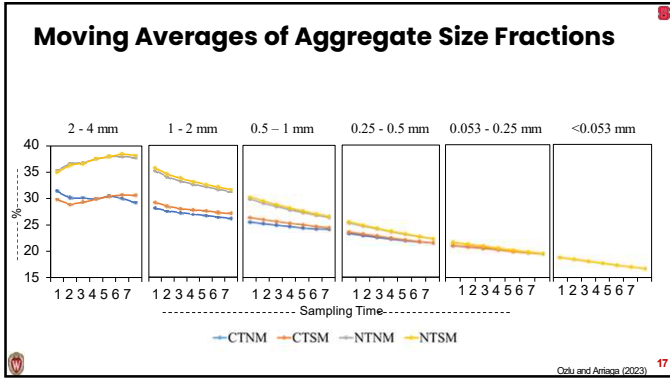
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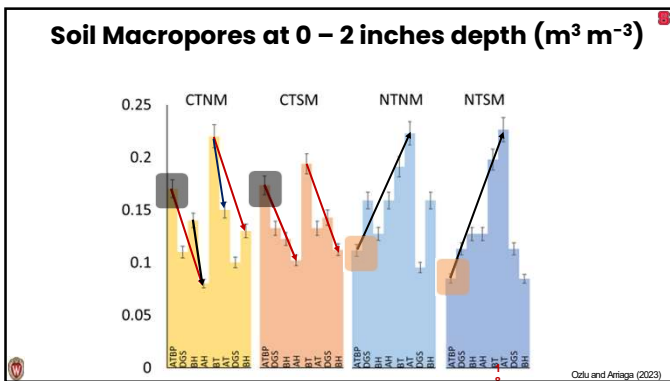
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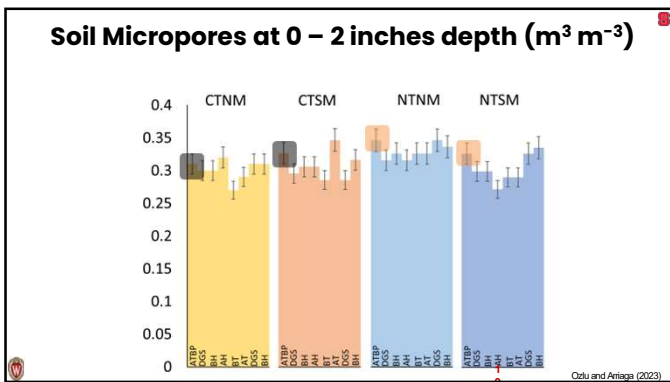
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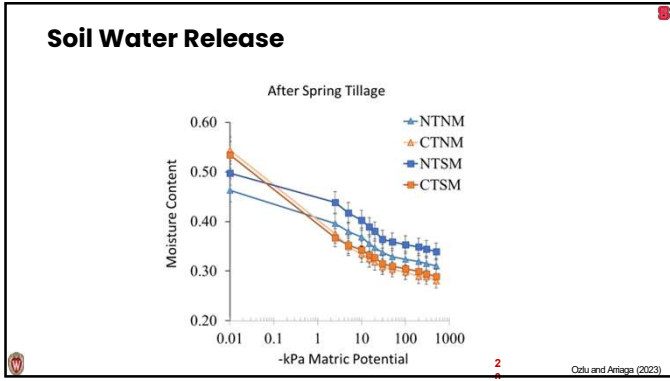
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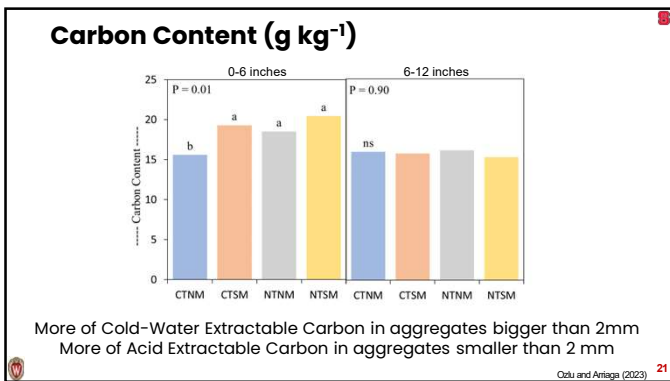
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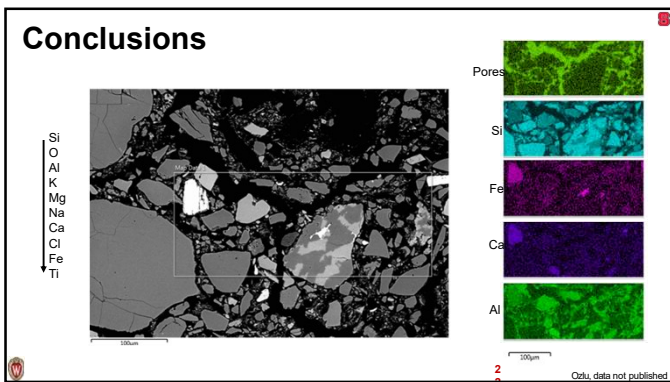
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### Manure Impacts on Soil Compaction

Ekrem Ozlu (eoazu@ncsu.edu)

Assistant Professor and  
Soil Management Extension Specialist

**North Carolina State University**

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