Washington County Water Consortium

June 5, 2024
2 to 3:45 pm
Remote meeting – Zoom
(If you are not on the Consortium listserv, please email
Adriana.Atcheson@co.washington.mn.us for the Zoom link and access code)

Agenda

2:00 – 2:05 **Welcome**
Introductions, Announcements

2:05 – 2:50 **Stormwater Management in Homeowner's Associations (HOAs)**

Topic: In the past year, the Washington Conservation District (WCD) has been working to support HOAs in stormwater management by conducting a survey and focus group to assess HOA leaders' knowledge and needs, and supporting them through resources such as a fact sheet package and a mini conference.

Presenter: Hannah Peterson, Community Stewardship Facilitator, WCD

2:50 – 3:30 **Soil Health and Nutrient Management on 100 Diversified Vegetable Farms**

Topic: High tunnels are utilized widely by Minnesota vegetable farmers, but after a certain number of years, yields tend to decrease – why could that be?

Presenter: Shane Bugeja, Extension Educator, UM Extension

3:30 – 3:45 **Questions/Adjourn**

Mapping soils on Minnesota's diversified vegetable farms: 100 farms project

Shane Bugeja and Natalie Hoidal

06/5/2024

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Background

- MN vegetable farms **decreasing** (Census of Ag)
  - 2022 => 2,620 total farms
  - 2017 => 2,840 total farms
- Smaller scale (<5 acres) farms **increasing**
  - 2022 => 1,339 farms
  - 2017 => 1,256 farms
- Extension nutrient/soil health materials
  - Decidedly has a row crop tilt

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High Tunnel Usage

- US Census of Ag (Minnesota):
  - "*Under Glass or Other Protection*"
  - 304 in 2017
  - 275 in 2022

- 2018-2022: 250 funded by NRCS

- ≈ 3-5 years -> neg. yield impact
  - "Tunnel Trouble" => Penn State Extension

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Project goals

- Understand why high tunnel soils become less productive after 3-5 years

- Understand soil fertility trends on vegetable farms
  - Phosphorus accumulation
  - Organic vs. inorganic sources

- Explore soil health testing utility

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100 farms project team

Minnesota Agricultural Experiment Station

University of Minnesota

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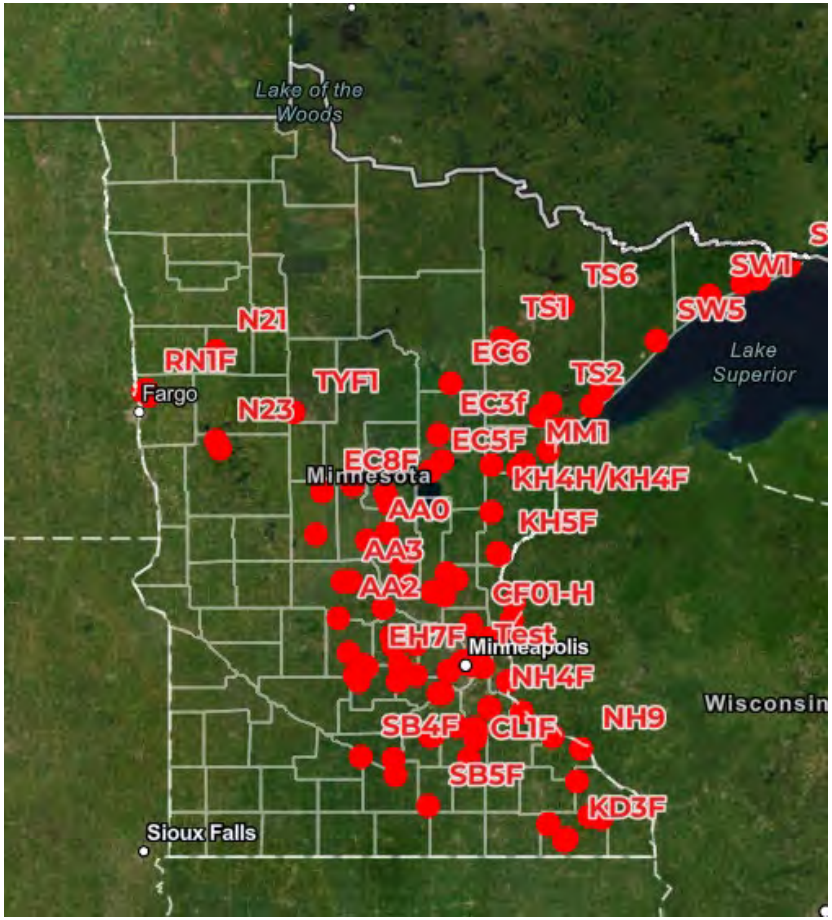
100 farms



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Part 1: Are high tunnels becoming less productive after 3-5 years?

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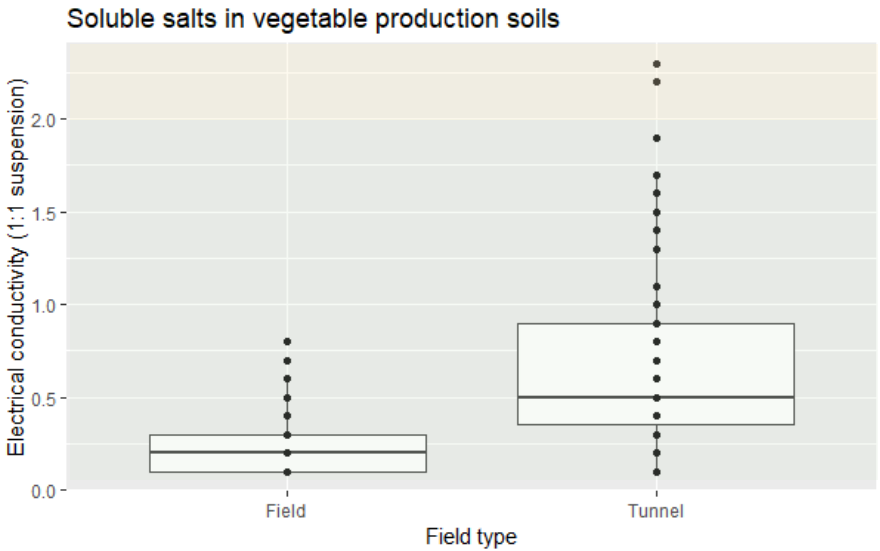
Hypothesis 1: salt accumulation



- **Electrical conductivity is (mostly) OK!**
- 2 sites were “very slightly saline”
- Follow-up testing looking at 6-12” cores did not show additional salt accumulation

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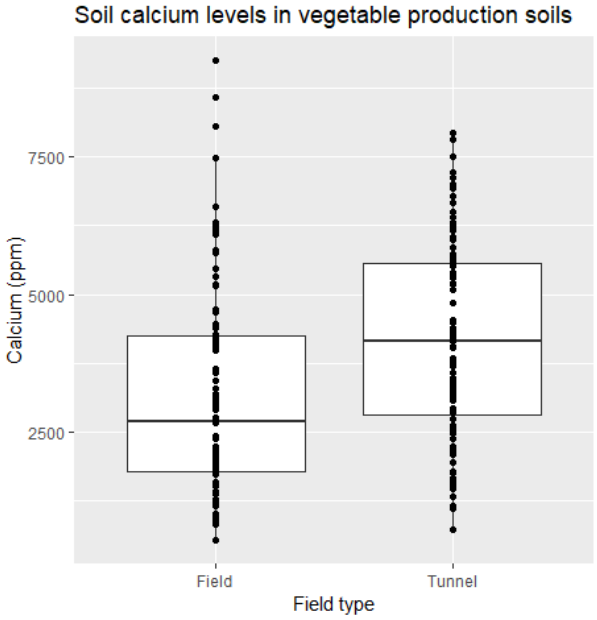
However…



- **Calcium levels were quite high**
- Excessive values = nutrient antagonism? (Mg, K, etc.)
- Effects on tomatoes (Reitz et al., 2021)
  - 0 AND 500 ppm CaCl2 caused end rot
- Reference values (RAL unpublished data)
  - Farm and field (1414 ppm)
  - Lawn and garden (2177 ppm)

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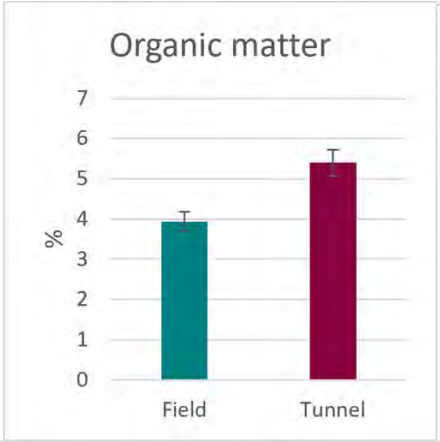
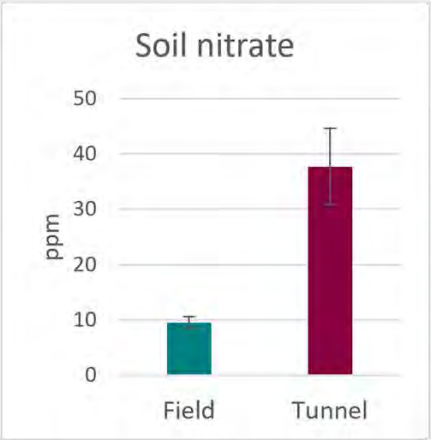
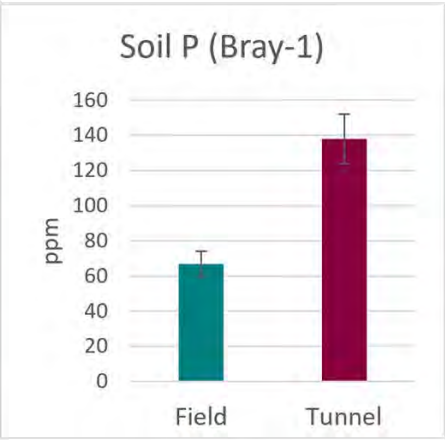
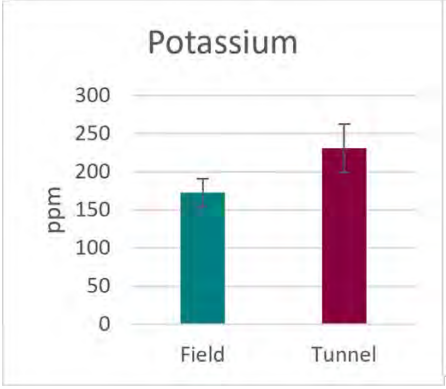
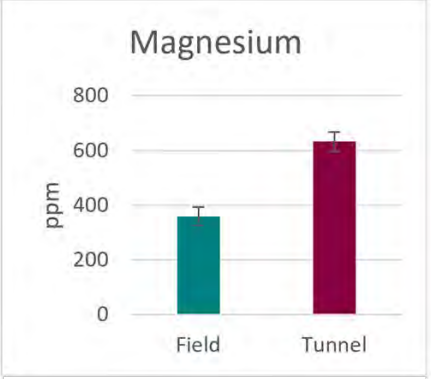
Hypothesis 2: Depletion of organic matter and /or nutrients

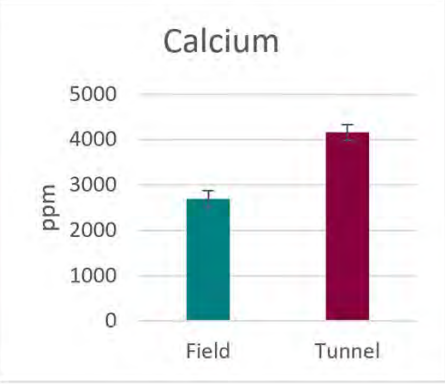












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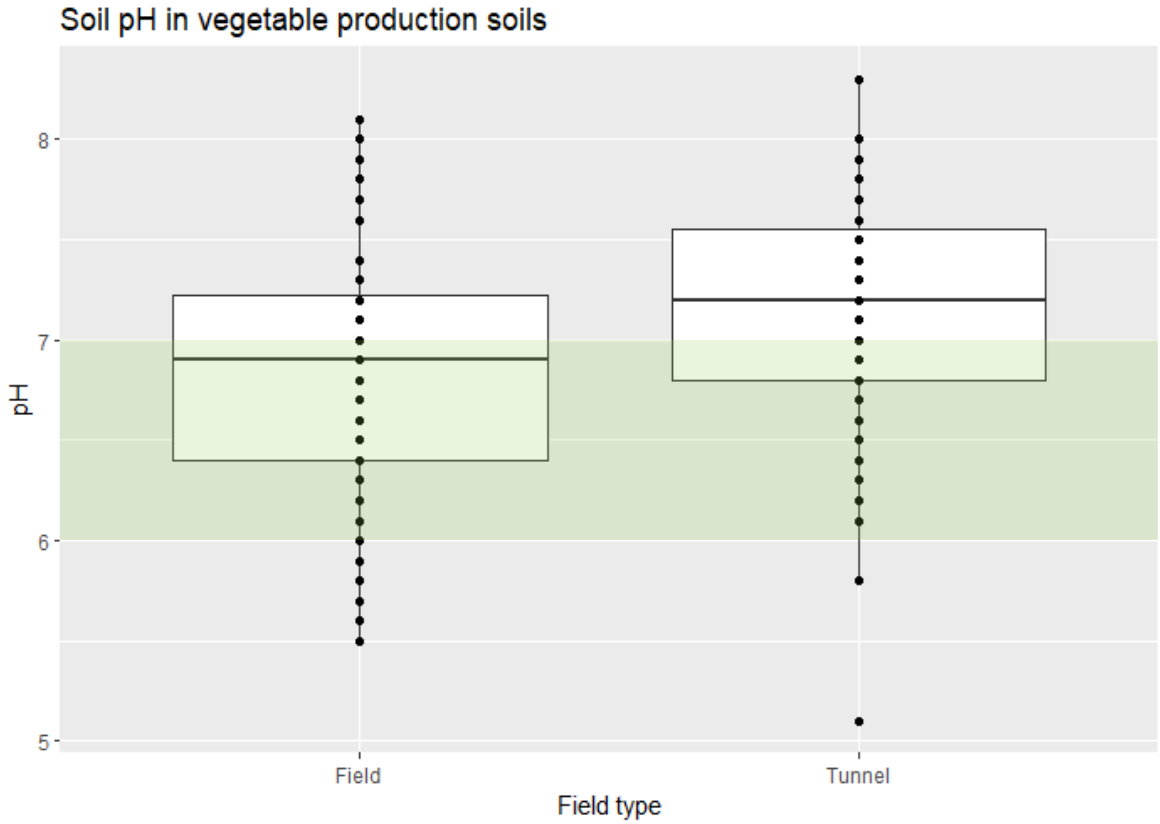
Hypothesis 3: pH changes over time



Ideal range for fruits and vegetables: 6-7

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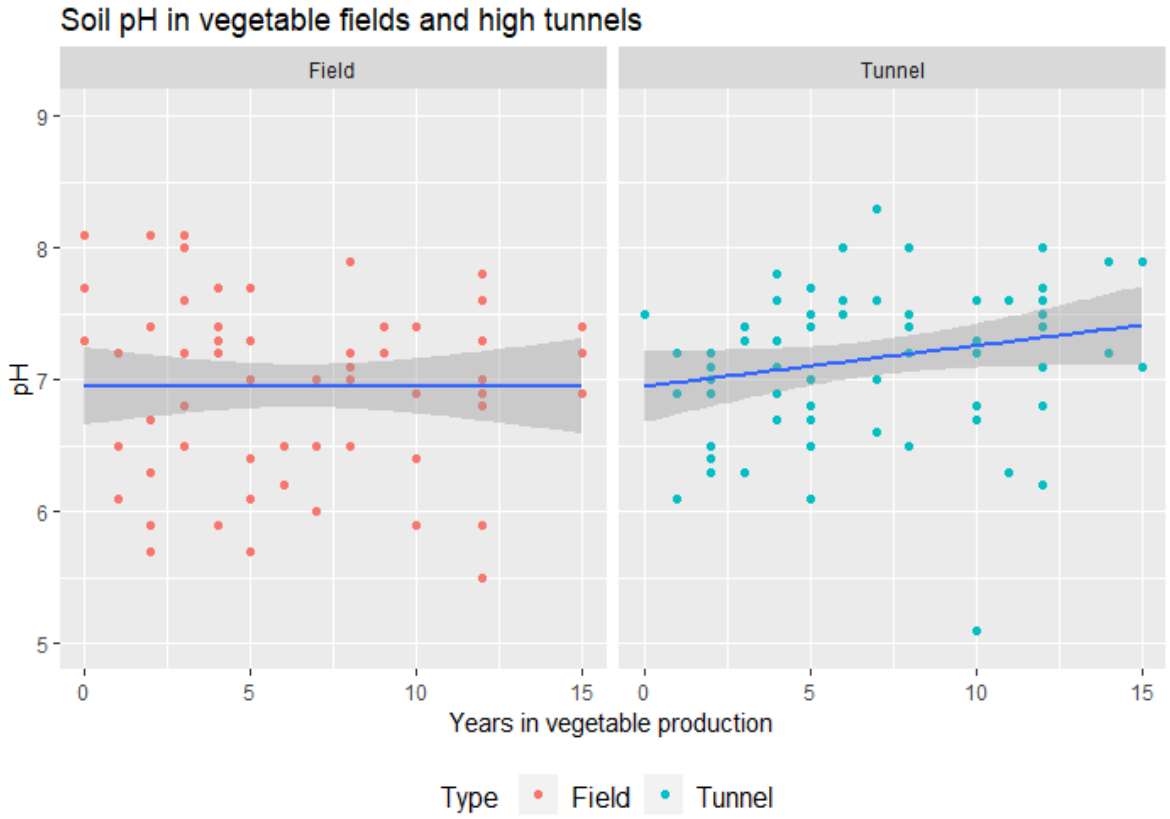
pH trends

pH increasing slightly over time in tunnels.

No correlation with water pH and alkalinity… BUT everyone's water was alkaline



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Water pH & alkalinity

- Median water pH: 7.9 (s.d. 0.305)
  - Ideal 5-7
- Median alkalinity: 212 ppm (sd 116)
  - Ideal 0-100 ppm

Likely complex relationships between water quality, environment, and fertility management

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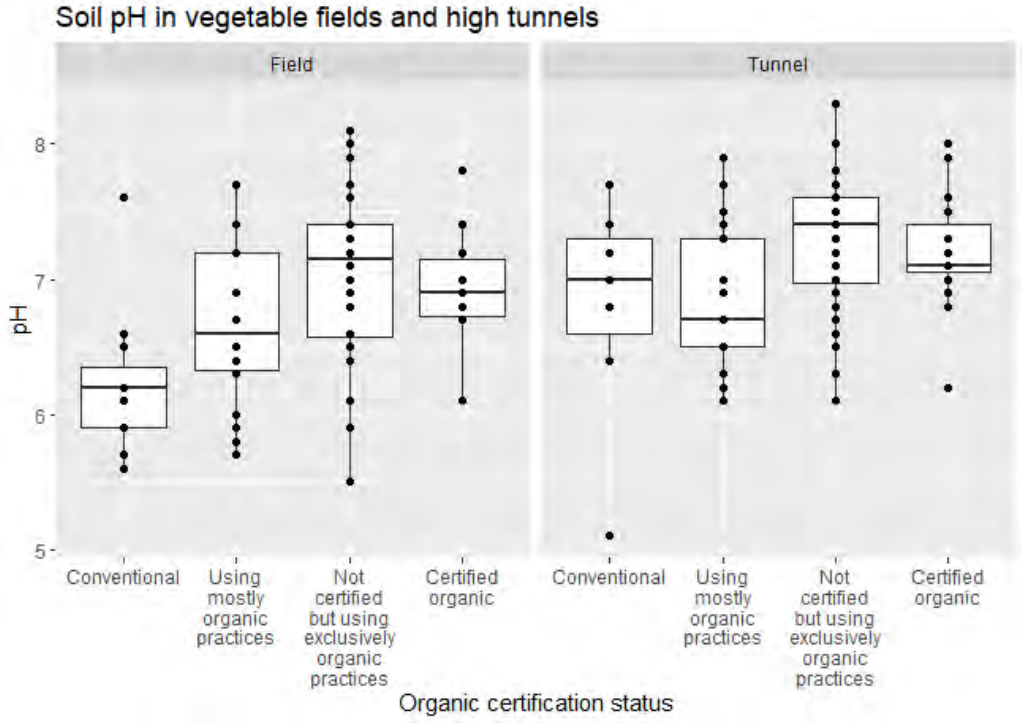
Likely complex soil pH relationships between water source, environment, and fertility choices…



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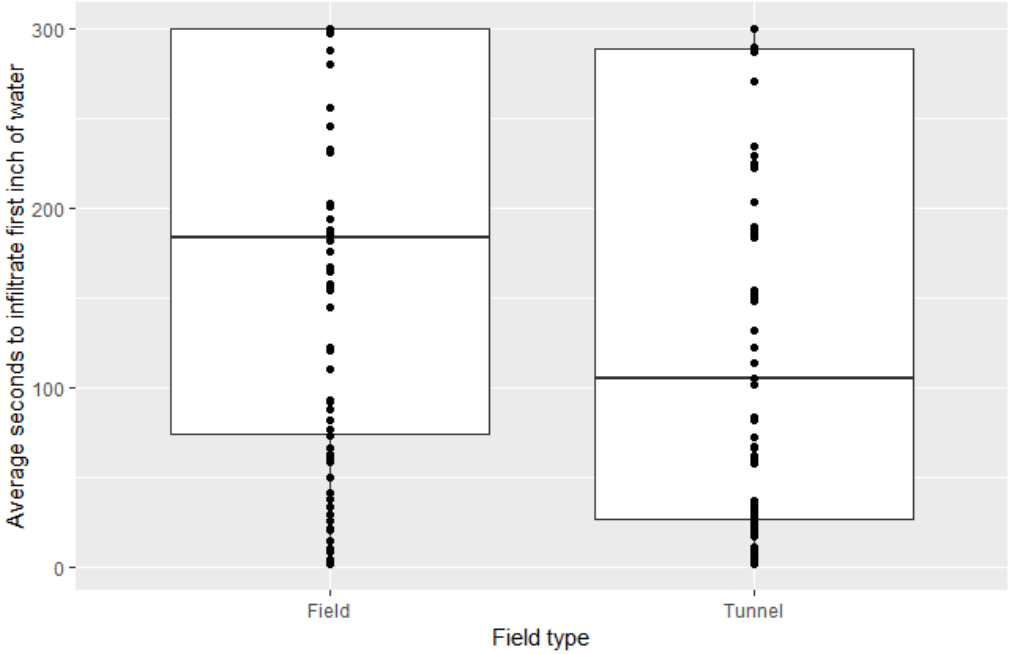
Hypothesis 4: water dynamics



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Anecdotally, some composts can act hydrophobic when allowed to completely dry out.

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- ~~Hypothesis 1: salts~~
  - But… calcium may cause problems?
- ~~Hypothesis 2: nutrient depletion~~
- Hypothesis 3: pH (??)
- Hypothesis 4: water issues (??)

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Part 2: Understand soil fertility trends & P

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Why focus on phosphorus?

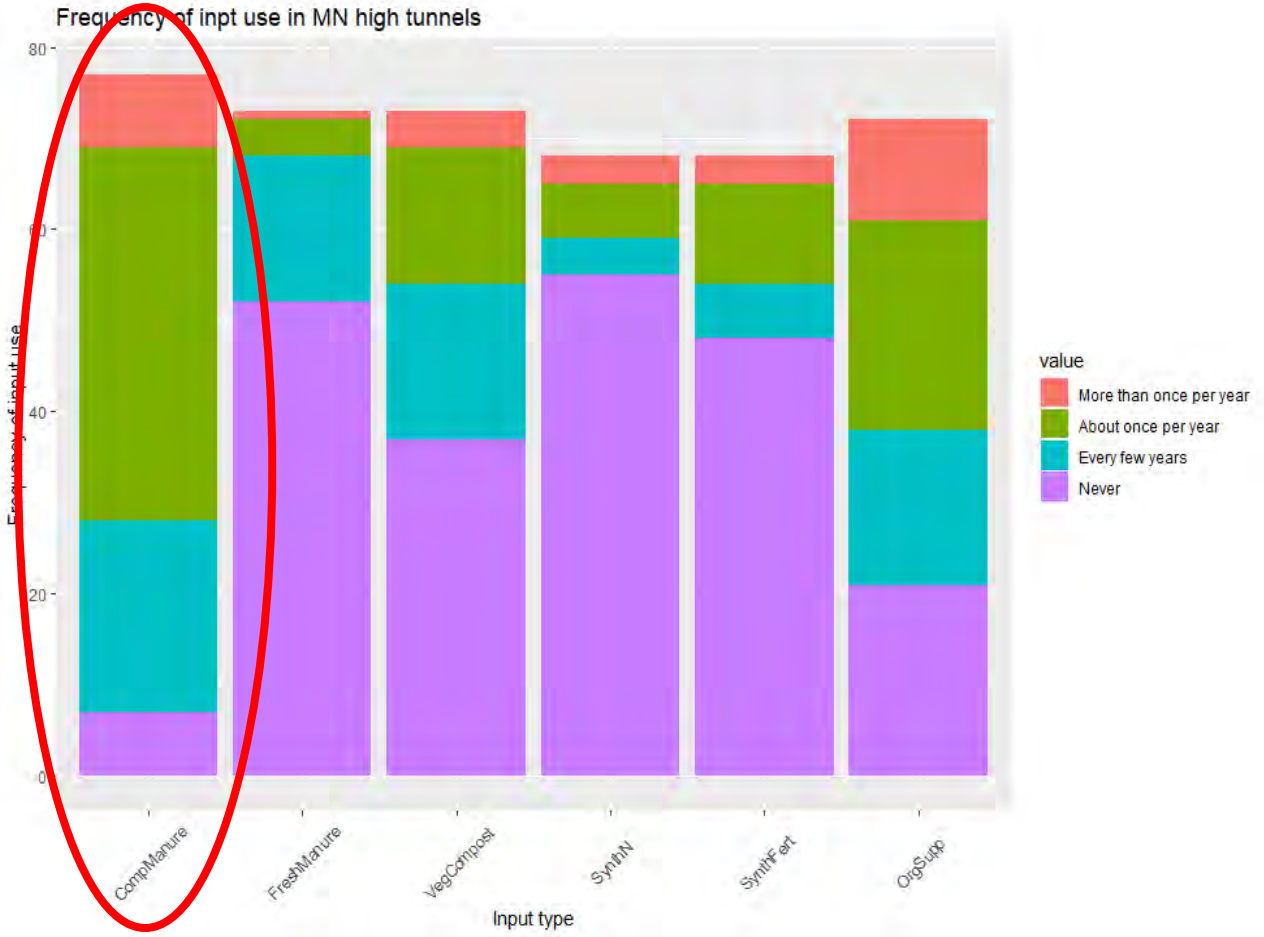

Image: P. Chadwick

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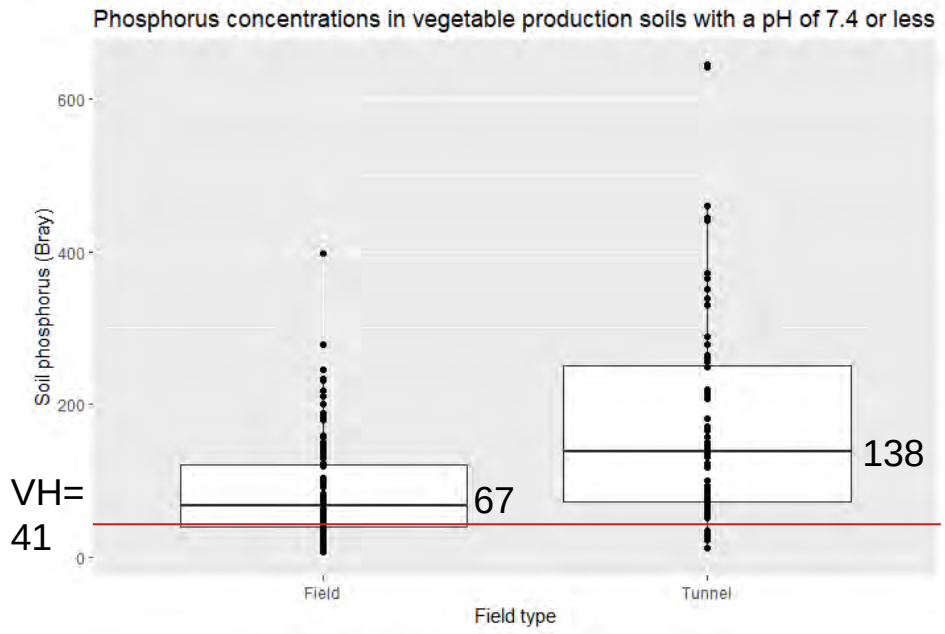
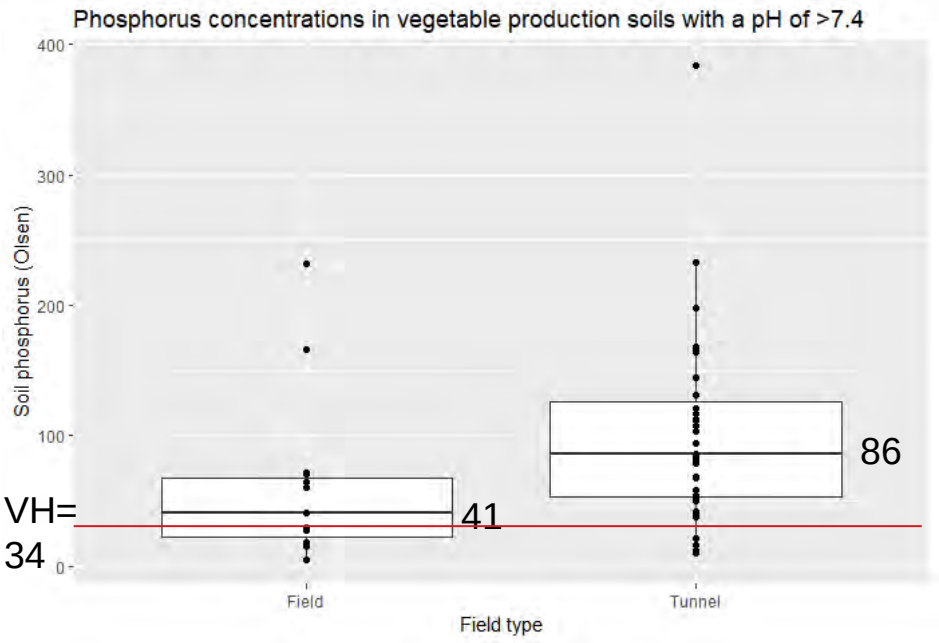
Phosphorus



Bray P1



Olsen

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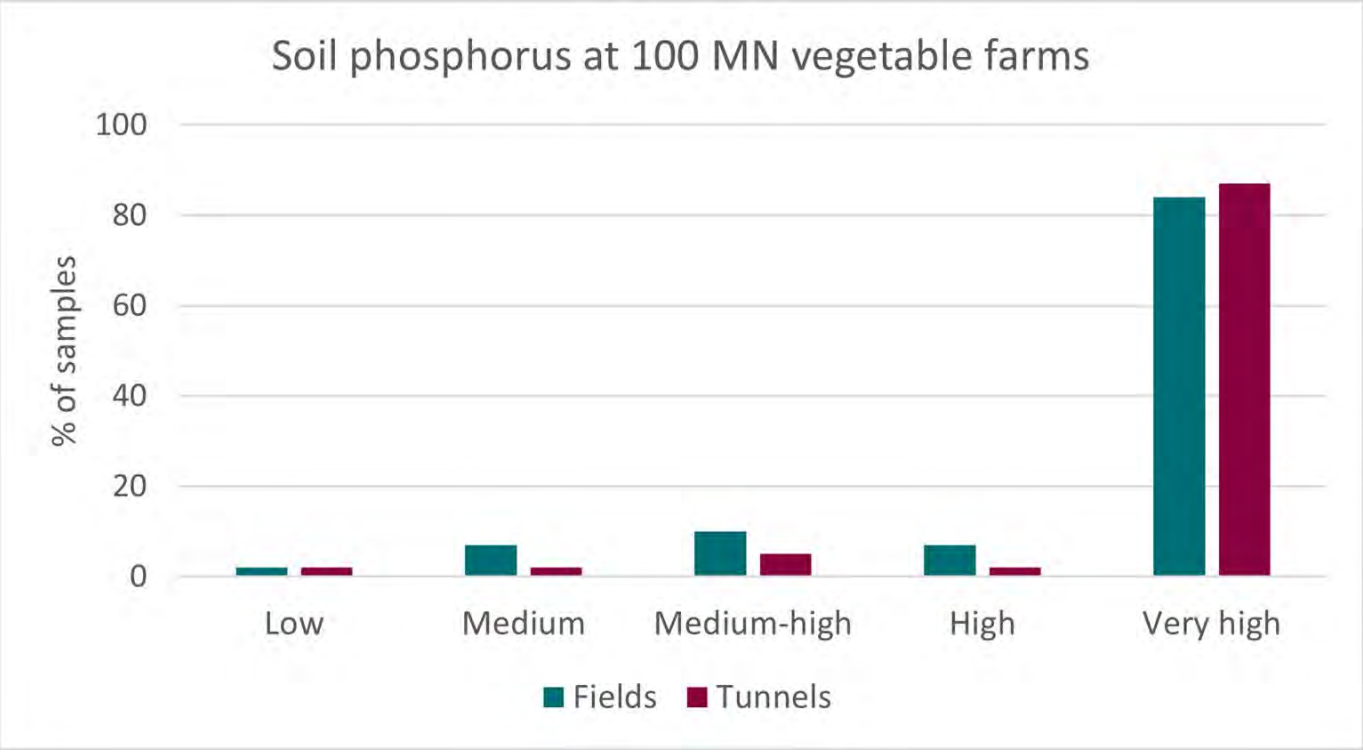

87% of tunnels and 84% of fields = “very high”

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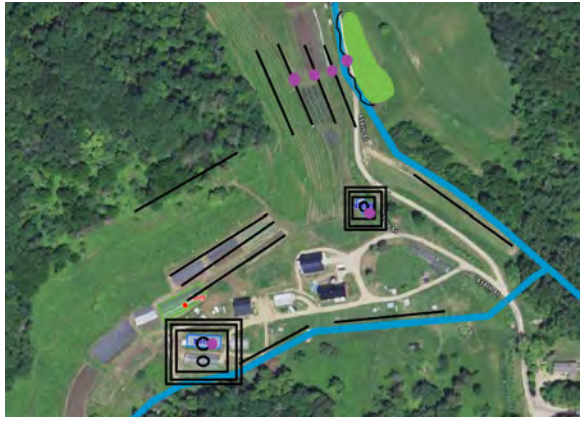
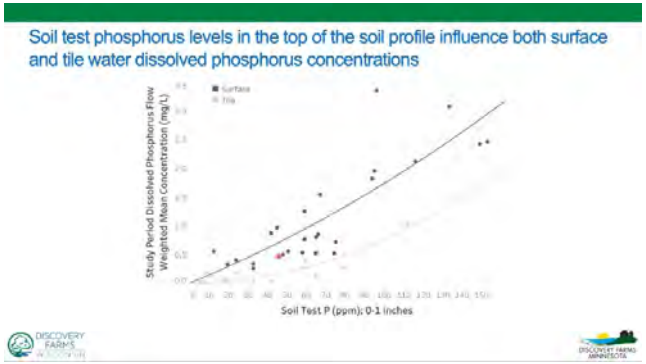
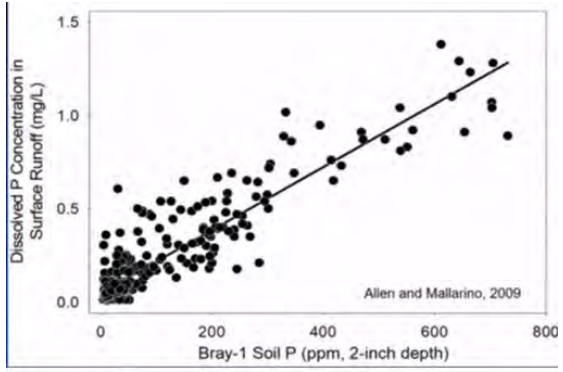
Does it matter?

Clues point to yes… but we're exploring further



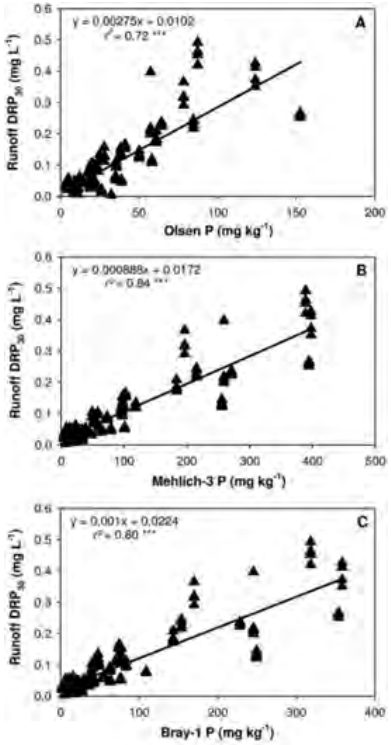
Part 2 of 100 farms project





Iowa

from webinar with Antonio Mallarino



Ontario

from Wang et al., 2010

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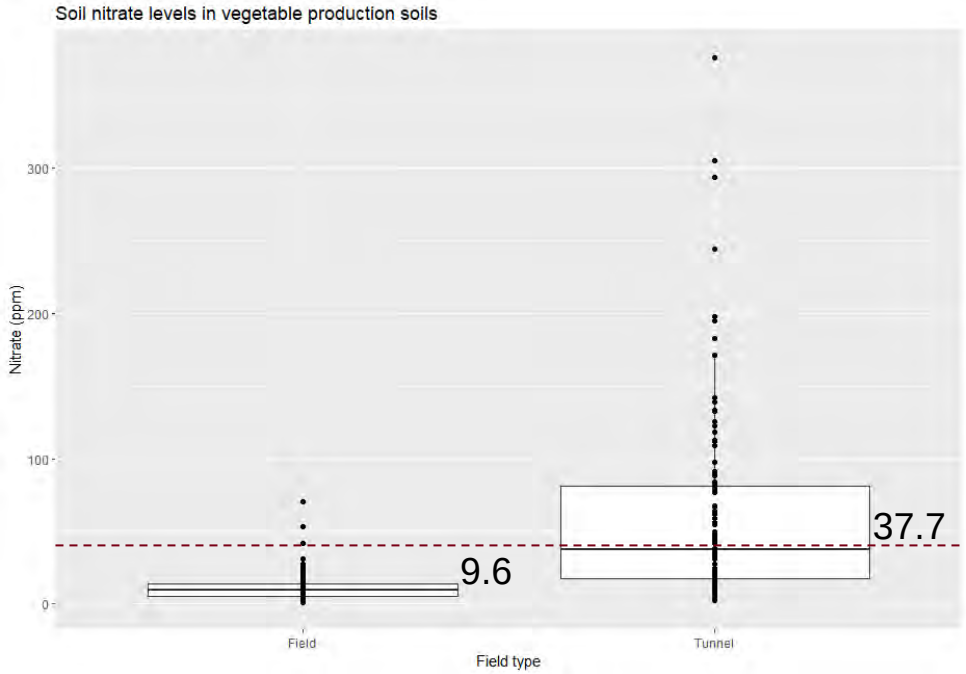
What about nitrates?



- We tested nitrates at a shallower depth (non-standard)
- Higher than we expected, especially in tunnels
- Follow up needed
- If you have >40ppm and >4.5% organic matter, you likely wouldn't need additional N.

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Nutrient management takeaways

- **We need to find realistic ways to provide N without all of the extra P and K**
  - Likely over-applying N too
  - Nutrient antagonism/weird effects of excess?

- Higher pH and/or water quality issues may help explain *some* production decreases over time
  - Teasing them apart could be difficult

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N without All the Extra P and K

- Organic sources
  - Blood or feather meal (sticky/$$$)
  - Chilean nitrate/$NaNO_3$ (organic restrictions)
  - Plant based composts
- Cover crops*
  - How to incorporate into plan?
- Switch to inorganic (urea, ect.)?
  - May not align with farmers practices/beliefs

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What do we do about all of the extra P?

- Stop adding more!

- We are still learning… but some best practices:
  - Buffers, buffers, buffers
  - Mine that soil!
  - Work with NRCS, SWCDs, Ag Water Quality Certification Program - $$$ and support

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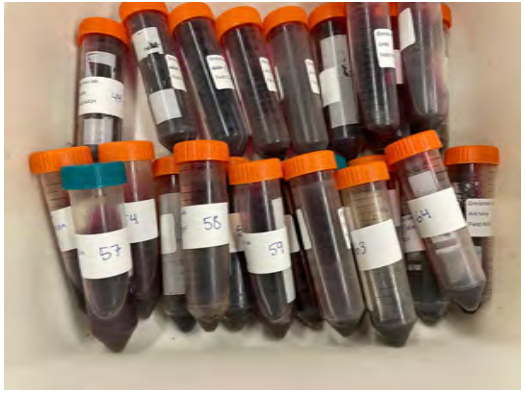

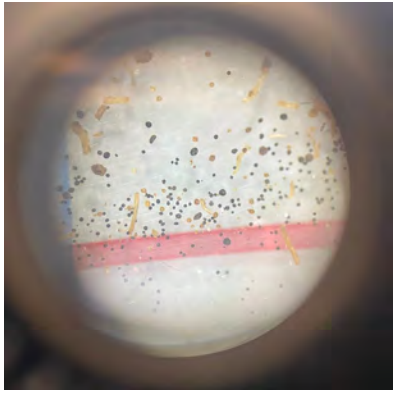

Part 3: In depth soil health tests

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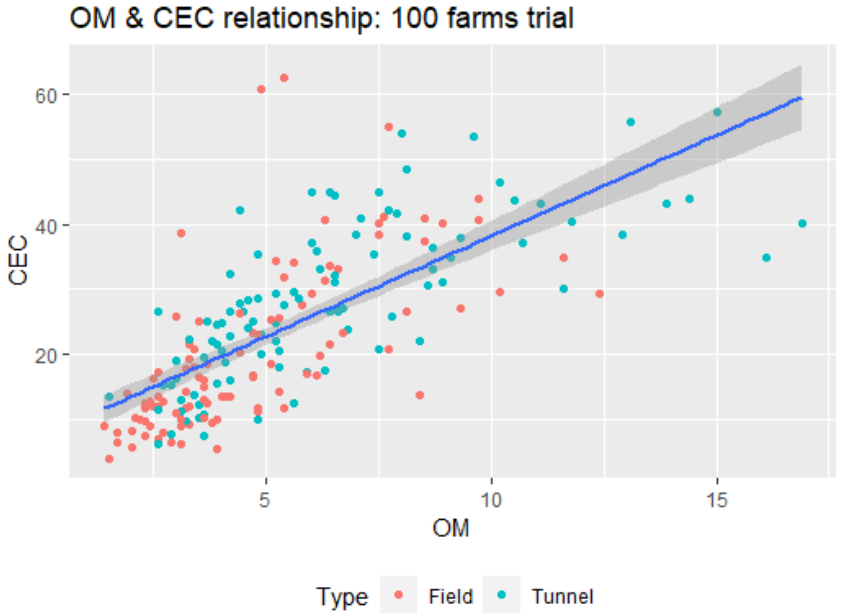
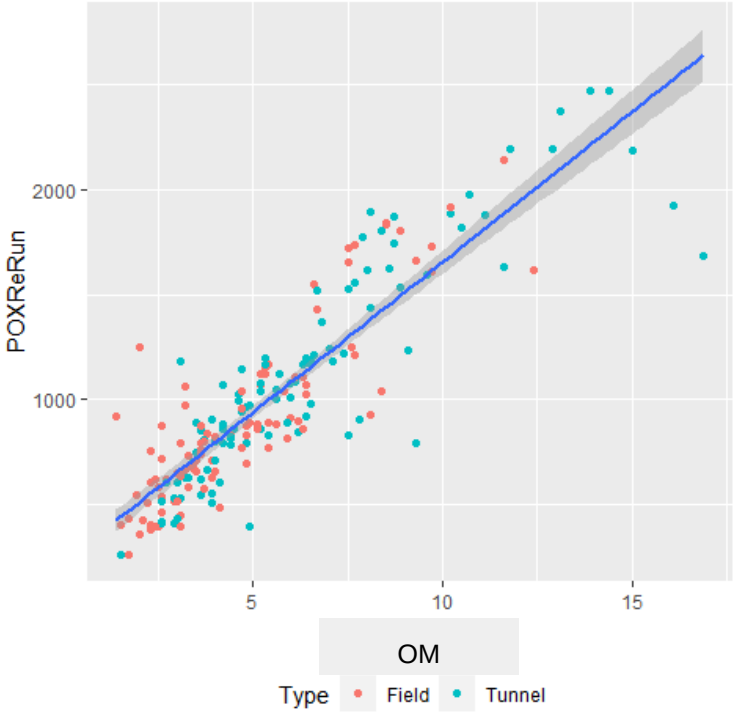
CEC and POX are closely related to OM





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Tillage is the practice that most significantly impacts soil health

Image: Wikimedia, Lewis Fausak

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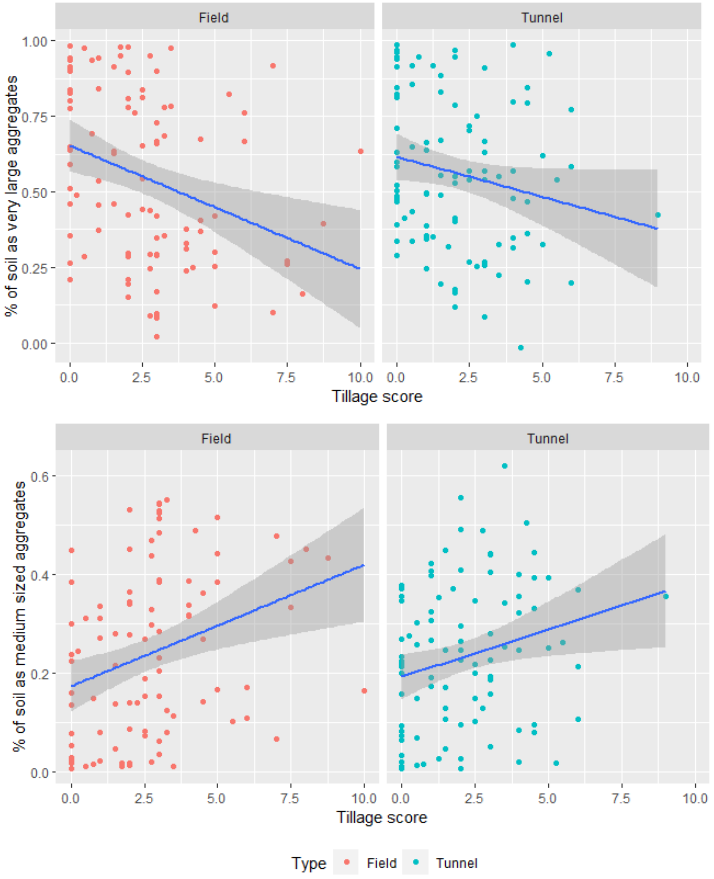
Aggregate stability trends

- Similar in fields vs. tunnels, not correlated with other soil variables or cover crop use

- In fields, more tillage → fewer very large aggregates, more medium sized aggregates. Correlation is not significant in tunnels.



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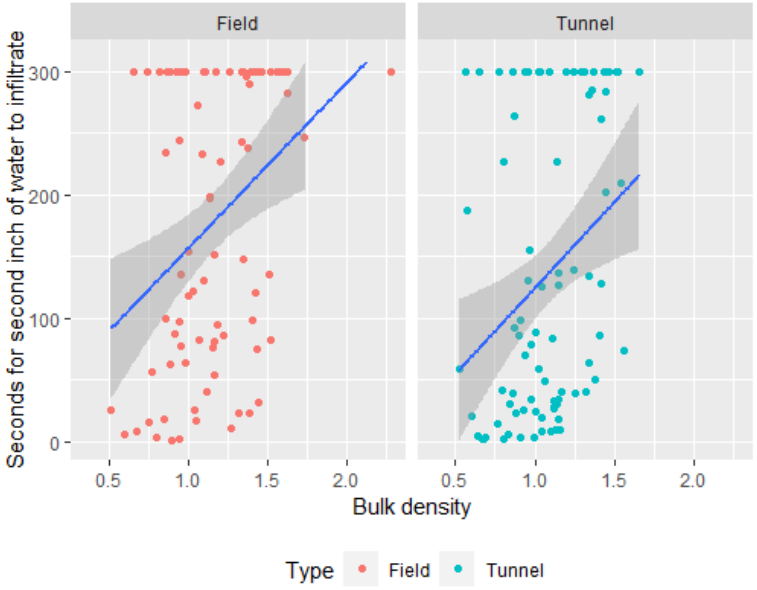
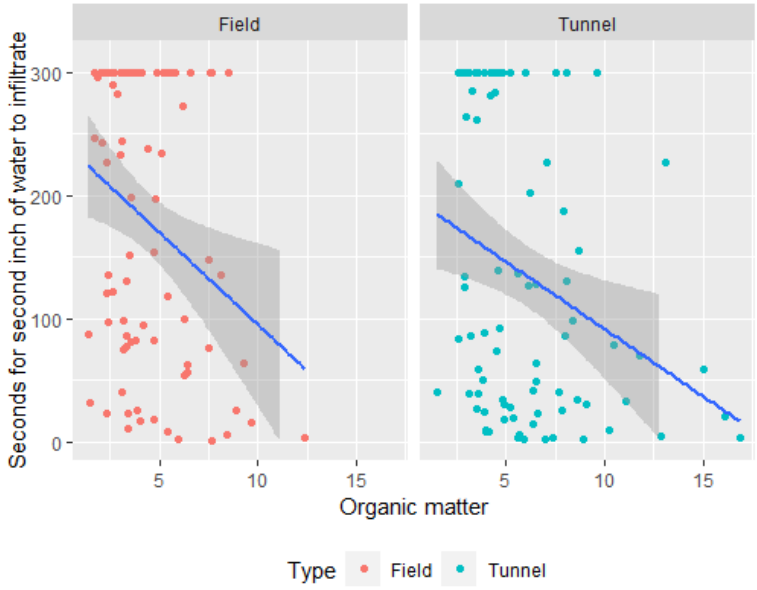
Infiltration trends





Weak but significant correlations

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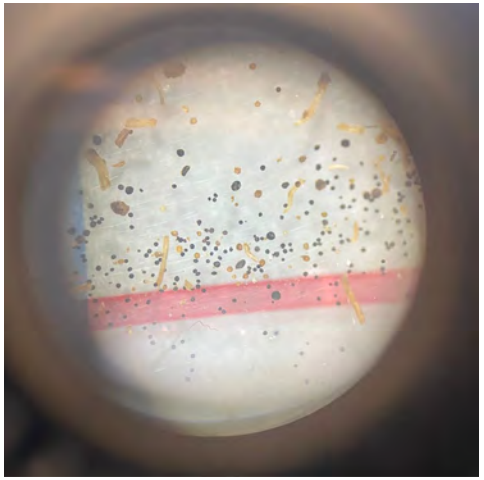
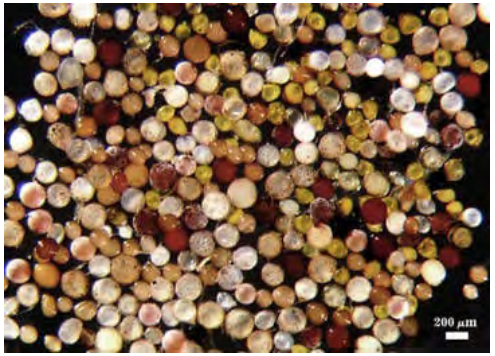
Arbuscular mycorrhizal fungi

- Important caveat: we looked at dormant spores, not active hyphae
- Similar in fields and tunnels
- AMF not significantly correlated with any other soil features related to pH, nutrients, etc.
- AMF wasn't correlated to tillage or cover crop use in either fields or tunnels





Photos: Nina Charlier & INVAM

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Reviewing the big picture…

Image: Karl Hakanson

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1. Work with your local Extension educator to develop a nutrient management plan

Image: Cory Ryan

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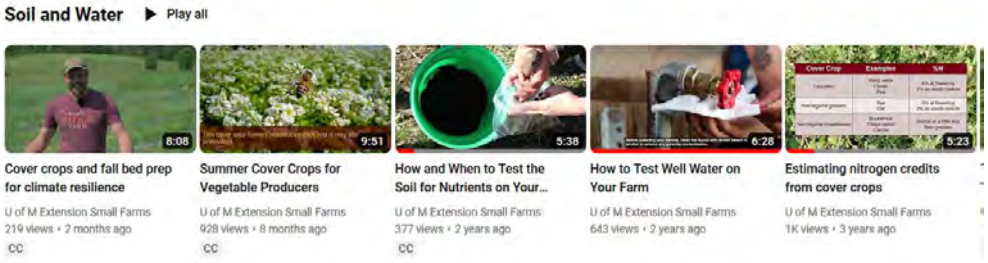
2. Consider more cover crops!

- Resources on the Extension website
- Extension Small Farms YouTube channel
- SARE guide to managing cover crops profitably



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3. Reducing tillage

CLIMATE RESILIENT
ORGANIC VEGETABLE PRODUCTION

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4. Acidifying irrigation water?

A few people did this during the summer, results seem positive but mixed.

Area of future research

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5. Mitigating excess P on the landscape

- Talk to your local NRCS office
- Local SWCD office
- Consider: buffers, berms, support for cover crops
- Basic soil health principles: keep the soil covered, prevent erosion, keep roots in the soil

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MN Agricultural Water Quality Certification Program

Certification program for agricultural producers

- Program Benefits:
  - Technical assistance with nutrient management and conservation practices design and implementation
  - Financial assistance to implement water quality practices
  - Recognition, Branding and Marketing opportunities
  - Farm Business Management program scholarships
  - Regulatory certainty for 10 years
- Free and voluntary, Non-regulatory

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Stormwater Management in Homeowner's Associations (HOAs)

Hannah Peterson

Washington County Water Consortium: Wednesday, June 5, 2024

INTRODUCTION

Hannah Peterson

Community Stewardship Facilitator at the Washington Conservation District through Climate Impact Corps

Washington Conservation District

East-Metro Water Resource Education Program

AmeriCorps | Climate Impact CORPS

AGENDA

- Project and Goals
- Report From Wilder
- Educational Materials
- HOA Mini Conference
- Questions

PROJECT BACKGROUND

- **Goal**
  - To assess the capacity of and identify effective resources for homeowner's associations (HOAs) and commercial property owners for proper maintenance of stormwater and green infrastructure practices.
- **Funding**
  - Minnesota Sea Grant College Program with funds from NOAA
  - Minnesota Water Resources Center, in partnership with the Minnesota Stormwater Research Council and the Minnesota Clean Water, Land and Legacy Amendment.
- **Research methods included survey and focus groups with the intent to**
  - Assess knowledge, behavior, barriers, and motivations of HOA board members and property managers related to stormwater and green infrastructure practices and their maintenance
  - Identify resources, tools, and information delivery strategies for HOAs to
    - better support maintenance of stormwater and green infrastructure practices
    - reduce stormwater pollution from irrigation, lawn care, and winter maintenance practices

RESEARCH REPORT

Prepared by Wilder

Full report on the Washington Conservation District Website: mnwcd.org/hoa-stormwater-tools

KEY TAKEAWAYS

- Lack of Engagement and Understanding
- Financial Concerns
- Want brief, digestible communications materials

SURVEY RESULTS

- 63 Responses
- **Knowledge and Concerns:**
  - 79% of HOA leaders identified stormwater ponds on their properties. 51% noted vegetative buffers. 7% did not know what infrastructure was present. 100% of Property Managers noted that they see stormwater ponds most often on their properties.
  - 82% of Property Managers said stormwater ponds caused the most confusion for their clients. Raingardens/infiltration basins followed at 45%.
  - Only 20% of HOA Leaders and 0% Property Managers considered maintaining stormwater infrastructure "Very much a priority"
  - **Costs/Budgeting:**
    - 34% of HOA leadership respondents named **annual maintenance cost** as the most important landscaping factor, and 24% of respondents named **long-term cost** as the second most important landscaping factor.
    - 57% of HOA leadership respondents said they do not have any money dedicated to stormwater infrastructure annually.
    - 55% of property manager respondents said it was "very challenging" to help their clients understand the need to budget for maintenance and upkeep of stormwater infrastructure.

SURVEY RESULTS Cont.

- **Educational Topics:**

Topics	Very important	Somewhat important	Not at all important
How to know what types of stormwater infrastructure are on your property and where they are located (n=63)	51%	38%	11%
How to maintain raingardens (n=63)	32%	30%	38%
How to maintain stormwater ponds (n=63)	54%	29%	17%
How to maintain native vegetation (n=63)	46%	44%	10%
How much to budget for annual and long-term stormwater infrastructure maintenance (n=63)	49%	37%	14%
How to reduce environmental impacts of lawn and landscape maintenance (n=63)	52%	41%	6%
How to reduce environmental impacts of snow and ice removal (n=63)	49%	37%	14%
How to reduce irrigation water use (n=63)	59%	25%	16%

- **Useful Formats:**

Downloadable fact sheets	81%
Short how-to videos	65%
In-person training workshops	33%
Full length how-to videos or webinars	22%
Other format	10%

FOCUS GROUP FINDINGS

- 12 Attendees
- **Knowledge and Concerns**
  - Board turnover results in loss of knowledge.
  - Confusion on who is ultimately responsible for managing stormwater.
  - Hard to find quality contractors that are educated on appropriate landscaping
  - **Cost**
    - Residents don't want to pay for maintenance and are regularly concerned about fees/increasing dues, yet also expect all landscaping to be done for them.
    - HOA insurance is increasing rapidly, causing frustration on budgeting
    - More information and assistance on grant applications for stormwater infrastructure upgrades is desired
  - Management companies don't often consider maintenance a priority and may not proactively provide information, educational materials, or resources.
- **Desires for Educational Materials:**
  - Cohesive
  - Simple, clear, and easy to follow
  - Aggregated in one spot
  - Infographics and simple illustrations
  - Consistently-distributed information that keeps the topic top-of-mind
  - Fun, educational videos
  - Presentations to board members and property management companies

RECOMMENDATIONS

- WCD should focus on high-level fact sheets that:
  - Contain simple language and infographics or illustrations.
  - Inform readers about why stormwater maintenance matters, and possible relevant impacts (e.g. flooding or property damage).
  - Elaborate on how stormwater infrastructure promotes environmental conservation.
- A list of knowledgeable contractors could also be a helpful resource.
- Resources should be cohesive and organized in one place.

HOA EDUCATION

Completed by WCD and Partners

EDUCATIONAL RESOURCES

- **Resource Page:** mnwcd.org/hoa-stormwater-tools
- **Fact Sheet Package:**
  - **Intro to Stormwater**: Why & How to Manage
  - **Stormwater Practices**: Identifying What Your HOA Owns
  - **Stormwater Ponds**: Function & Maintenance Requirements
  - **Wetlands**: Protecting Natural & Constructed
  - **Managing Costs**: Planning & Budgeting for Maintenance
  - **Lawn Care Practices**: Save Money & Protect Our Water
  - **Native Vegetation**: How to Maintain Plant Life
  - **Snow & Ice Removal**: To Protect Water Resources
  - **Invasive Species**: How to Identify & Manage
  - **Tree Care:** How to Properly Plant & Maintain Trees
- **Case Studies**
- **Raingarden and Maintenance Video Series:**
  - Lower St. Croix Watershed Partnership: https://www.youtube.com/@lowerst.croixwatershedpart9722/playlists
- **Compiled List of Existing Resources**

HOA MINI CONFERENCE

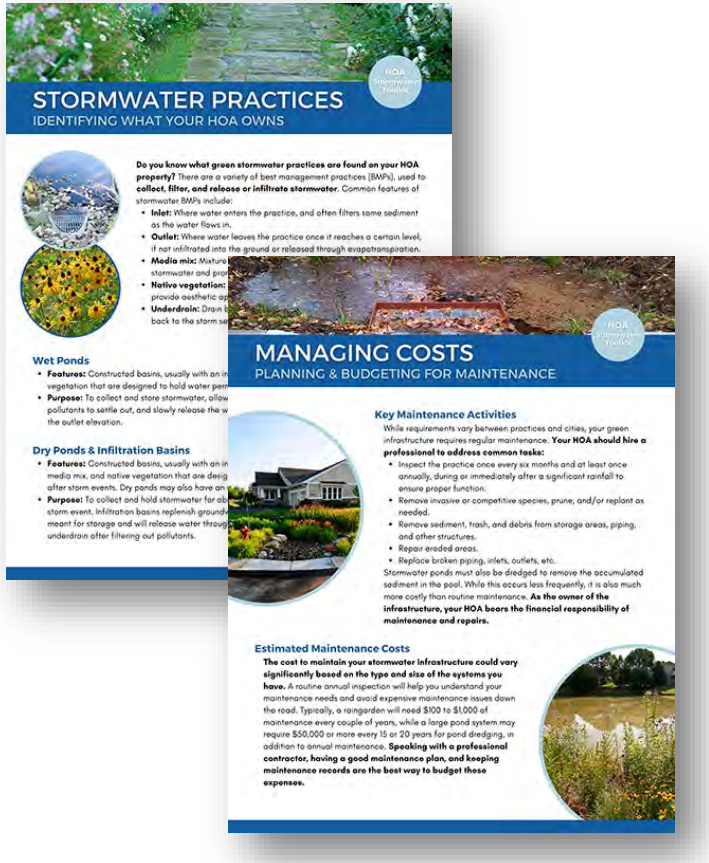
- **Date**: Friday May 31st
- **Time**: 10:30-12:30
- **Location**: Stillwater Library
- **Attendees**: HOA Board Members, Property Managers, & Residents

PRESENTATION SESSIONS

- Session 1 – **Intro to Stormwater Ponds**
  - **Andrew Coyne**, City of Stillwater
- Session 2 - **Native Plants & Soil Health**
  - **Cameron Blake**, WCD
- Session 3 - **Long-Term Operation & Maintenance of Stormwater Treatment Practices**
  - **Andy Erickson**, SAFL/UMN

FACT SHEET REVIEW & DISCUSSION

- What do you like?
- What do you dislike?
- Do you have any ideas for improvements?
- Is there anything you do not understand?



QUESTIONS?

- Contact me at hpeterson@mnwcd.org

THANK YOU!