Meso and Macrofauna Responses to Biochar in Urban Soils

Seneca Lee | Friday, April 30th 2021 | Master's Practicum

SEAS SCHOOL FOR ENVIRONMENT AND SUSTAINABILITY
UNIVERSITY OF MICHIGAN

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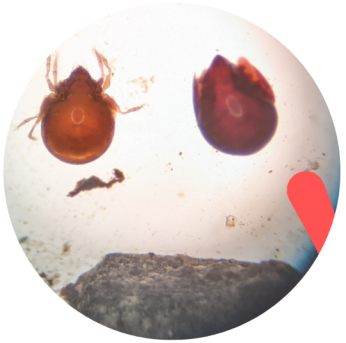
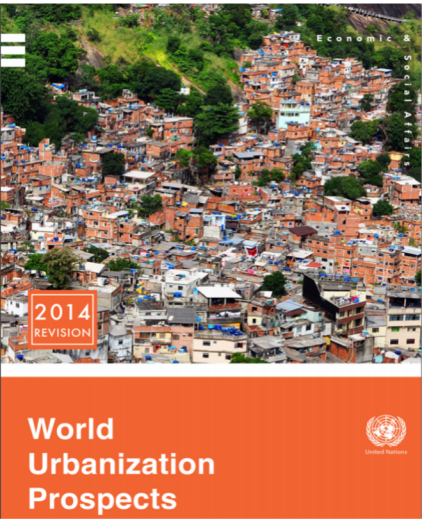
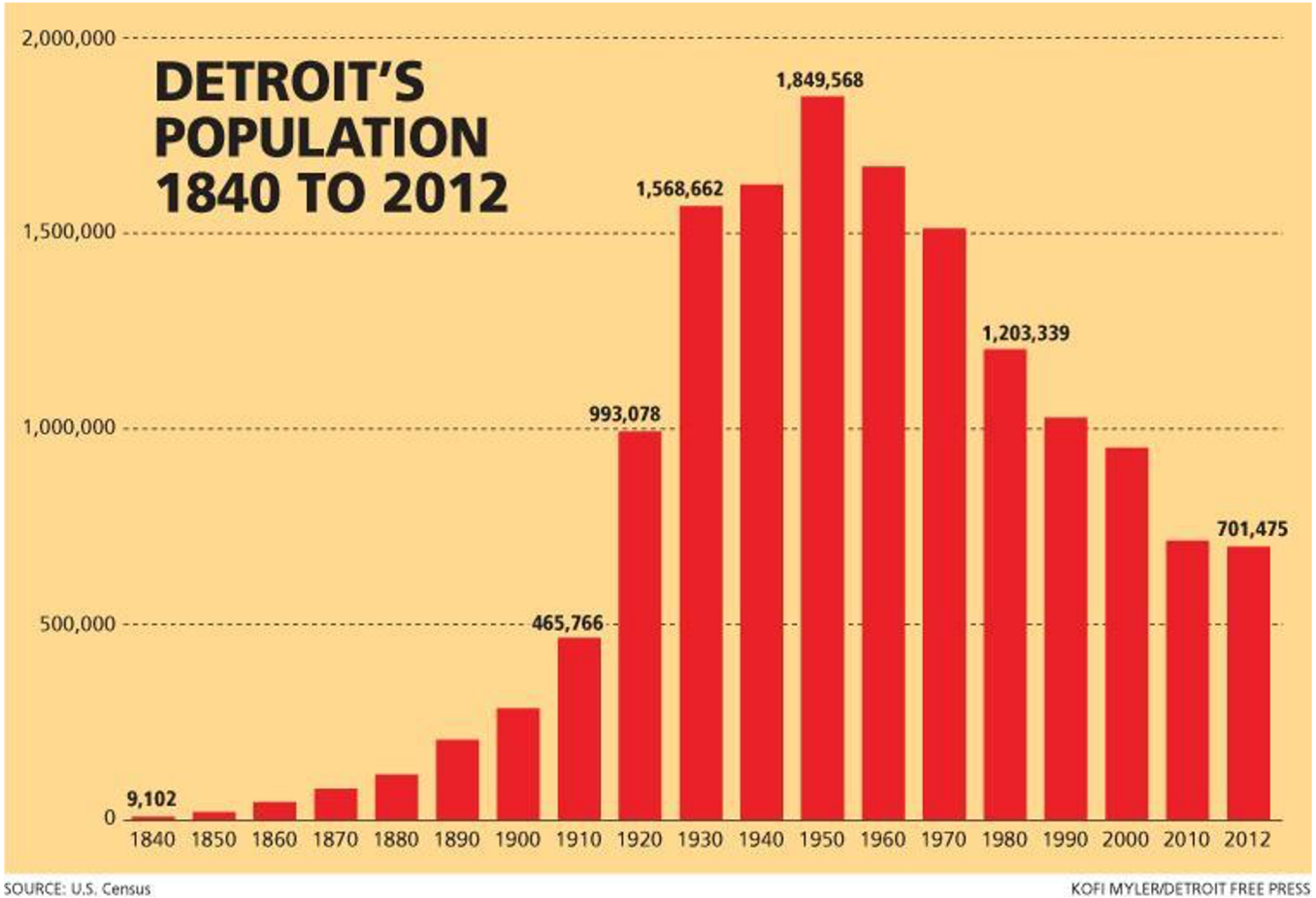


Urbanization


Economic & Social Affairs
2014
REVISION
World
Urbanization
Prospects
United Nations


1950
2014
2050
Percentage urban
75 or over
50 to 75
25 to 50
Less than 25
No data



Urbanization

Urbanization

Previous site of John A. Owen Elementary School. Torn down around 2015.

ASSESSING AND MANAGING SOIL QUALITY FOR URBAN AGRICULTURE IN A DEGRADED VACANT LOT SOIL

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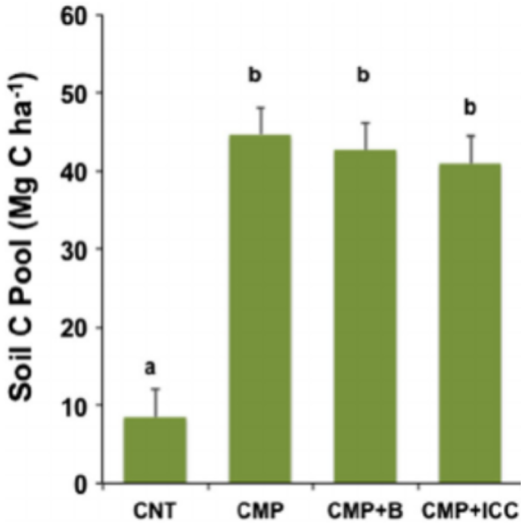
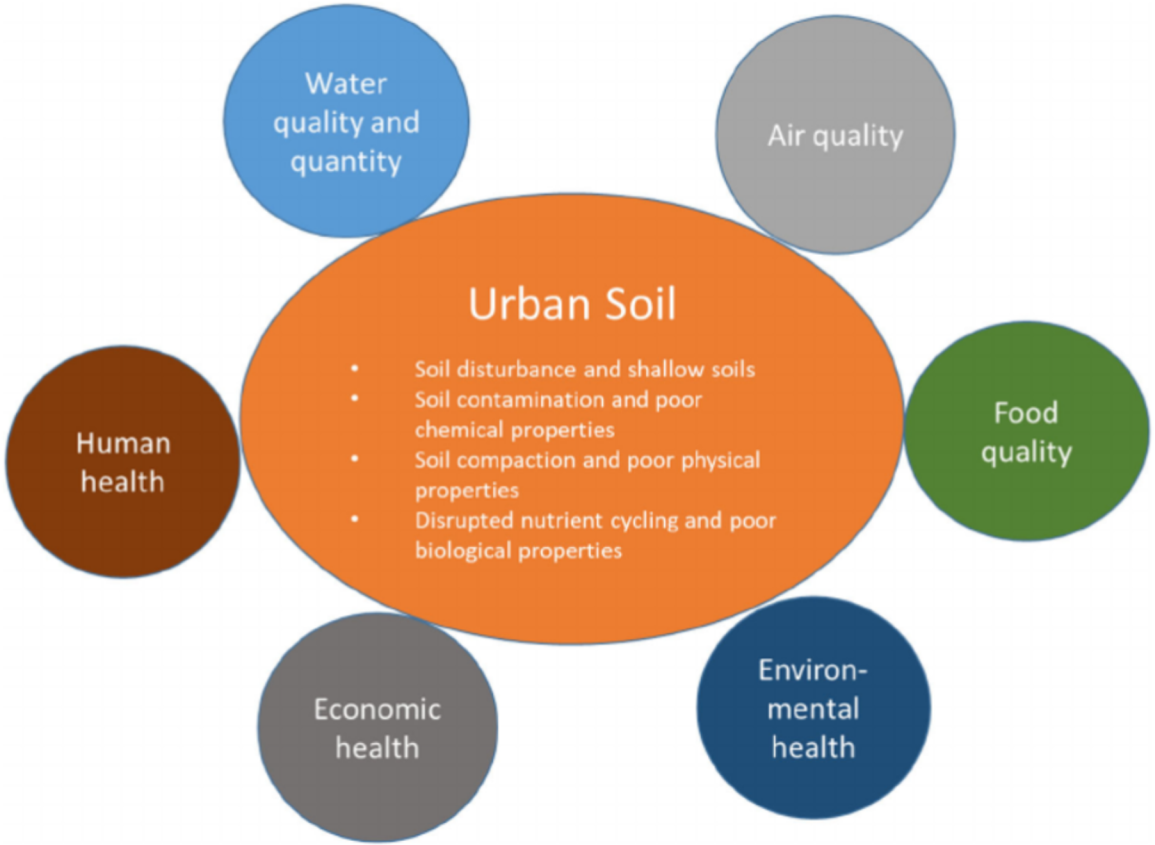


Greening the Rust Belt: A Green Infrastructure Model for Right Sizing America's Shrinking Cities

Joseph Schilling & Jonathan Logan

Urbanization

Disrupted Urban Soils

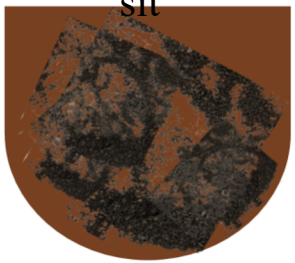


Amazonian Dark Earths or Terra Preta de índio

Common soils of the Amazon region

Burn soil

Let soil sit

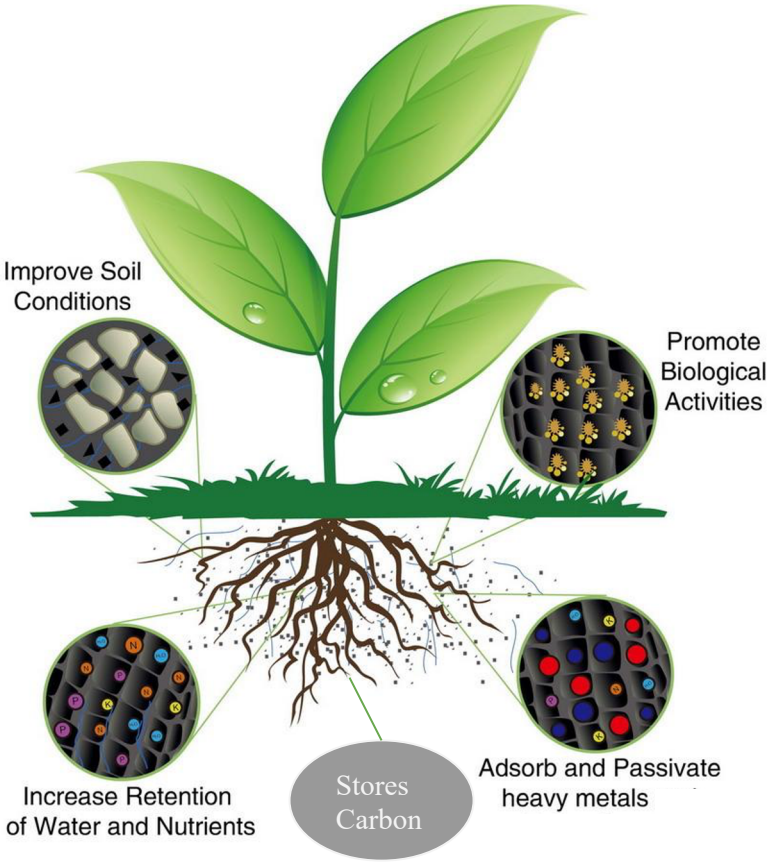


Increase soil fertility further

Otterpohl, R., Bettendorf, T., & Wendland, C. (2015). Terra Preta Sanitation 1: Background, Principles and Innovations. Photo Credit: Dr Bruno Glaser

Terra Preta de índio Benefits

Terra Preta found in Amazon basin



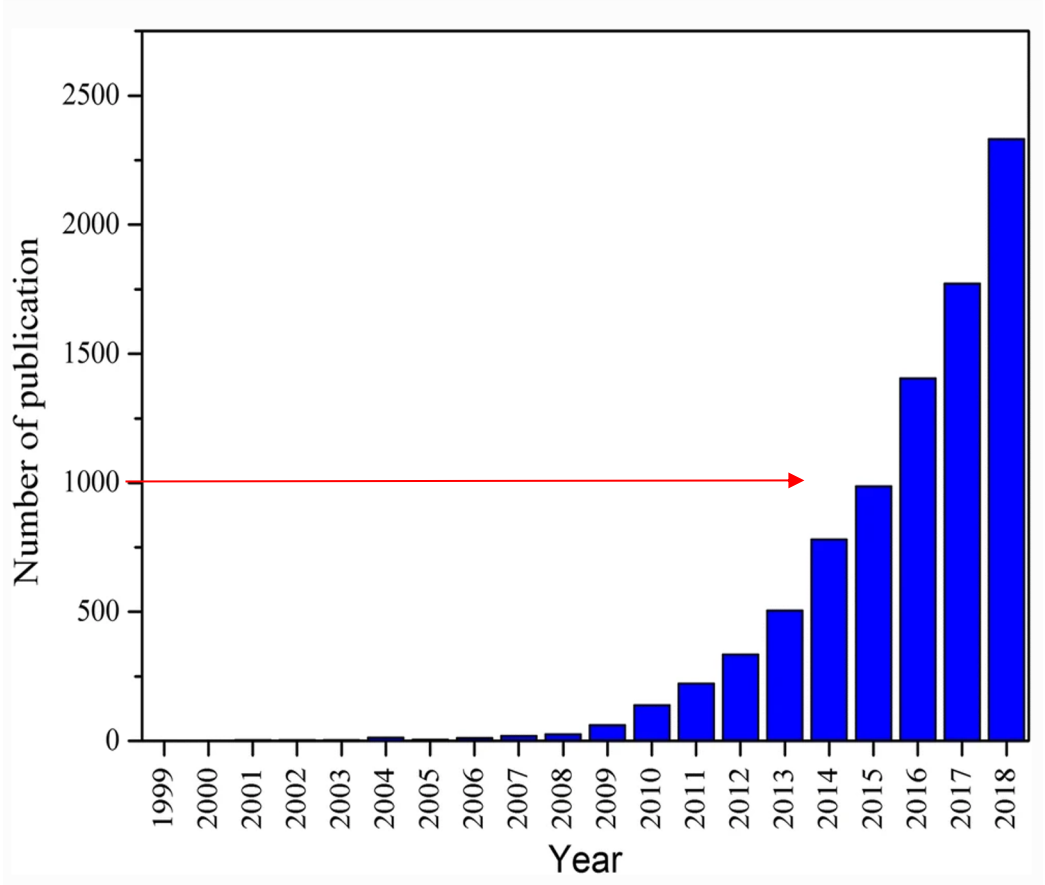
Otterpohl, R., Bettendorf, T., & Wendland, C. (2015). Terra Preta Sanitation 1: Background, Principles and Innovations. Photo Credit: Dr Bruno Glaser

Biochar

Inspired by Terra Preta de indio/ ADE

Primarily made from cellulosic plant-derived biomass

Engineered to store carbon and improve soil quality



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Biochar

Meso/macro Fauna and Soil

Physical
- Mixing
- Burrows
- Fragmentation
- Aggregate formation

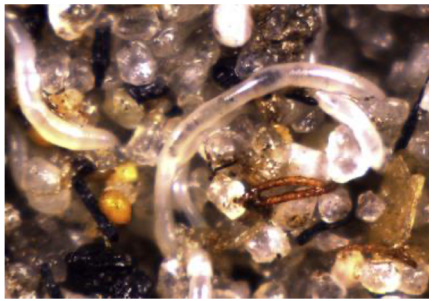
Chemical:
- Mineralization

Biological
- Feed on decaying matter
- Feed on microfauna

Biochar and Soil Fauna

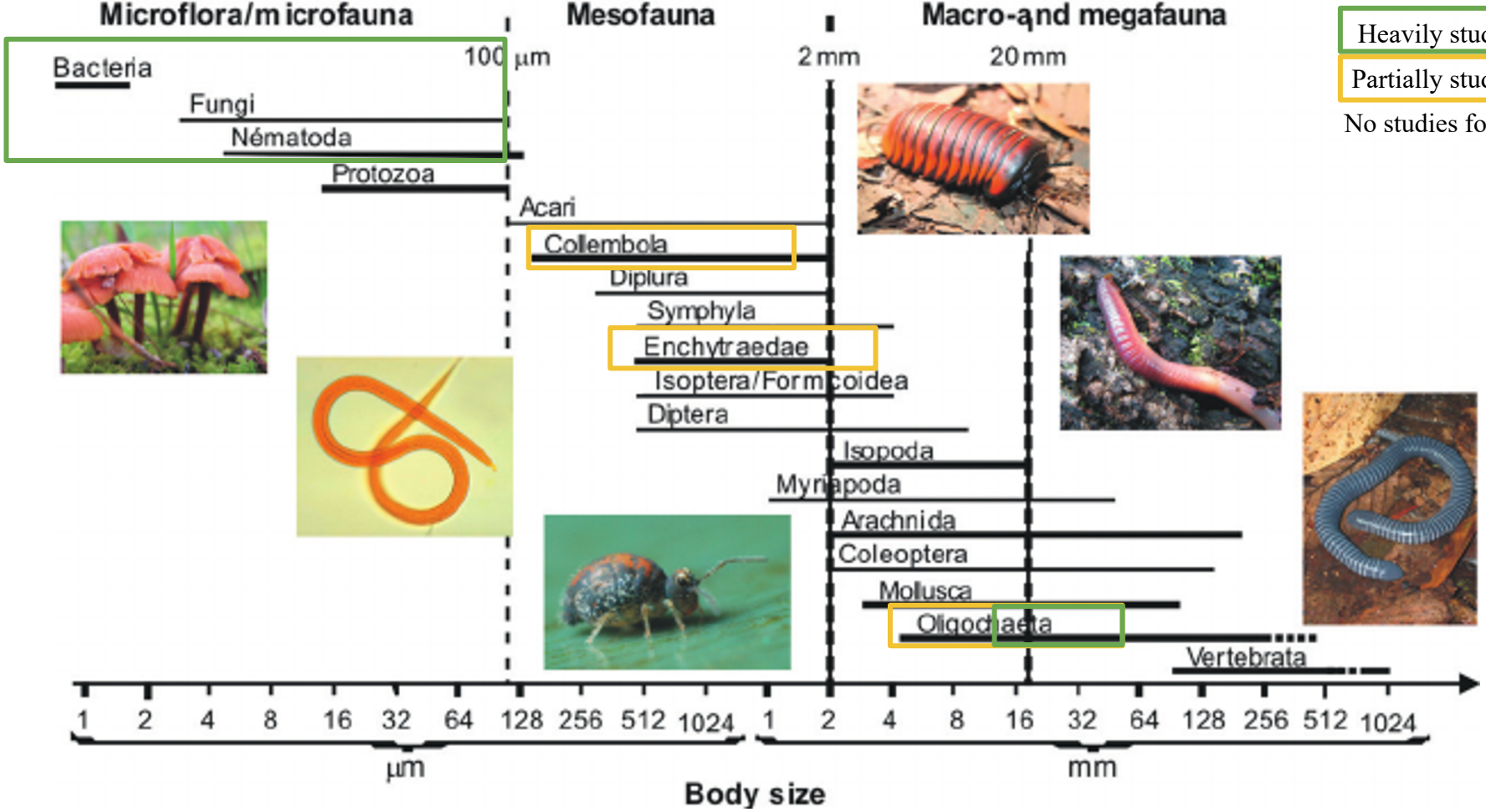
Earthworms

Nematode



Enchytraeid

Collembola
Folsomia candida



Swift, M. J., Heal, O. W., Anderson, J. M., & Anderson, J. M. (1979). Decomposition in terrestrial ecosystems.

Key Questions

What direct or indirect effects, if any, does biochar have on invertebrates on an individual level (species abundance) and community level (diversity)?

Increase in water storage

More water available

Biochar effect on invertebrates

Abundance & Diversity

Differences in soil organic carbon

More nutrient availability

Increased plant growth

How will different particle sizes of biochar influence the abundance and diversity of arthropods?

Differences in available habitat for microbes (pores)

Increase microbial biomass and diversity

Increase in and more diverse food available for predators

Particle size on

Indirect effect on abundance & diversity

Method & Materials

Field Work

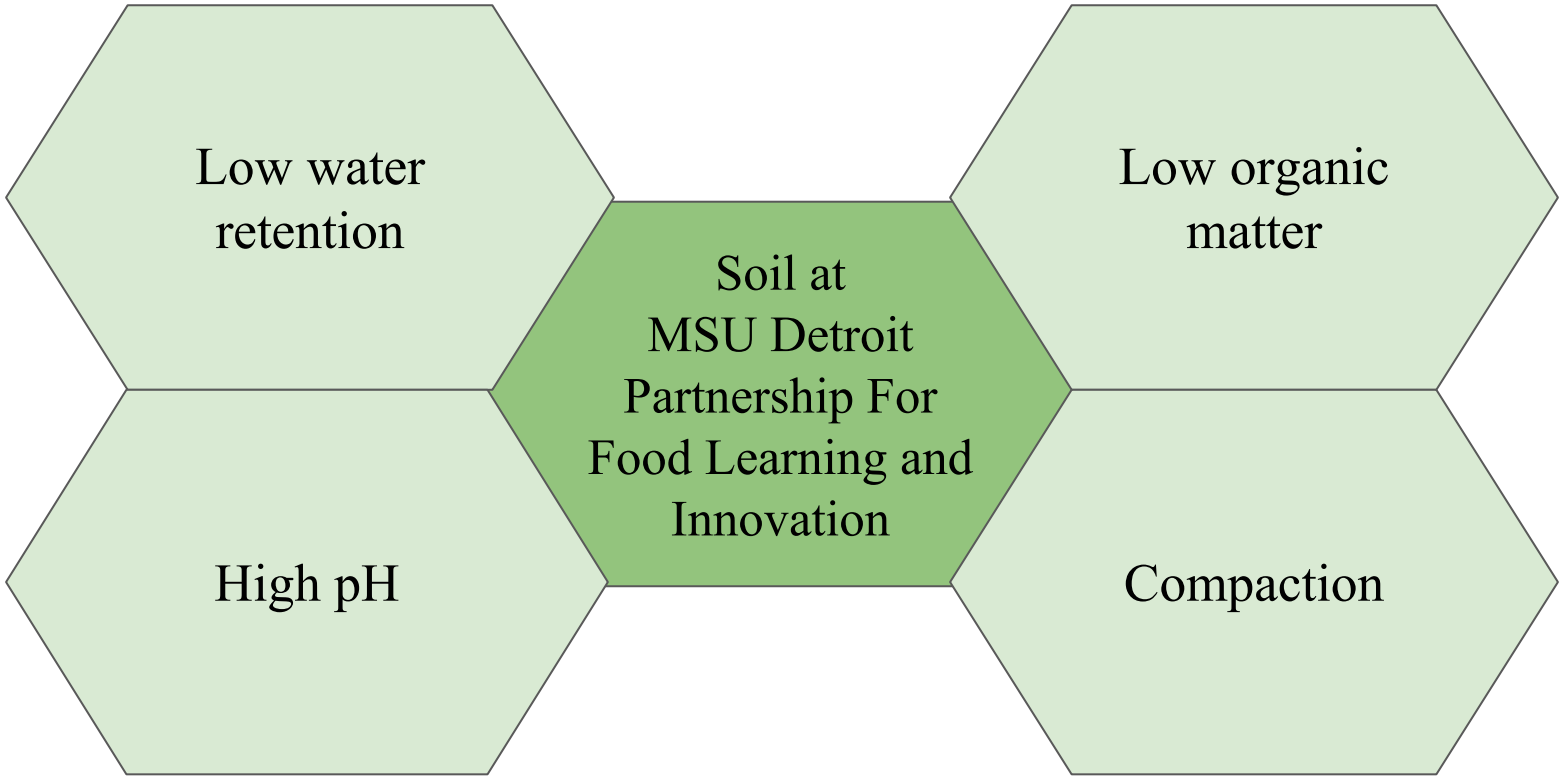
Identification

Statistics


MICHIGAN STATE
UNIVERSITY
Detroit Partnership for
Food, Learning and Innovation

Methods

Disrupted Urban Soils at Research Site



Methods

Experimental Design

- Treatments

None (N)
Mixed (M)
>1mm (L)
≤1mm (S)