Campus Organic Garden and Local Food System Research

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TAYLOR UNIVERSITY

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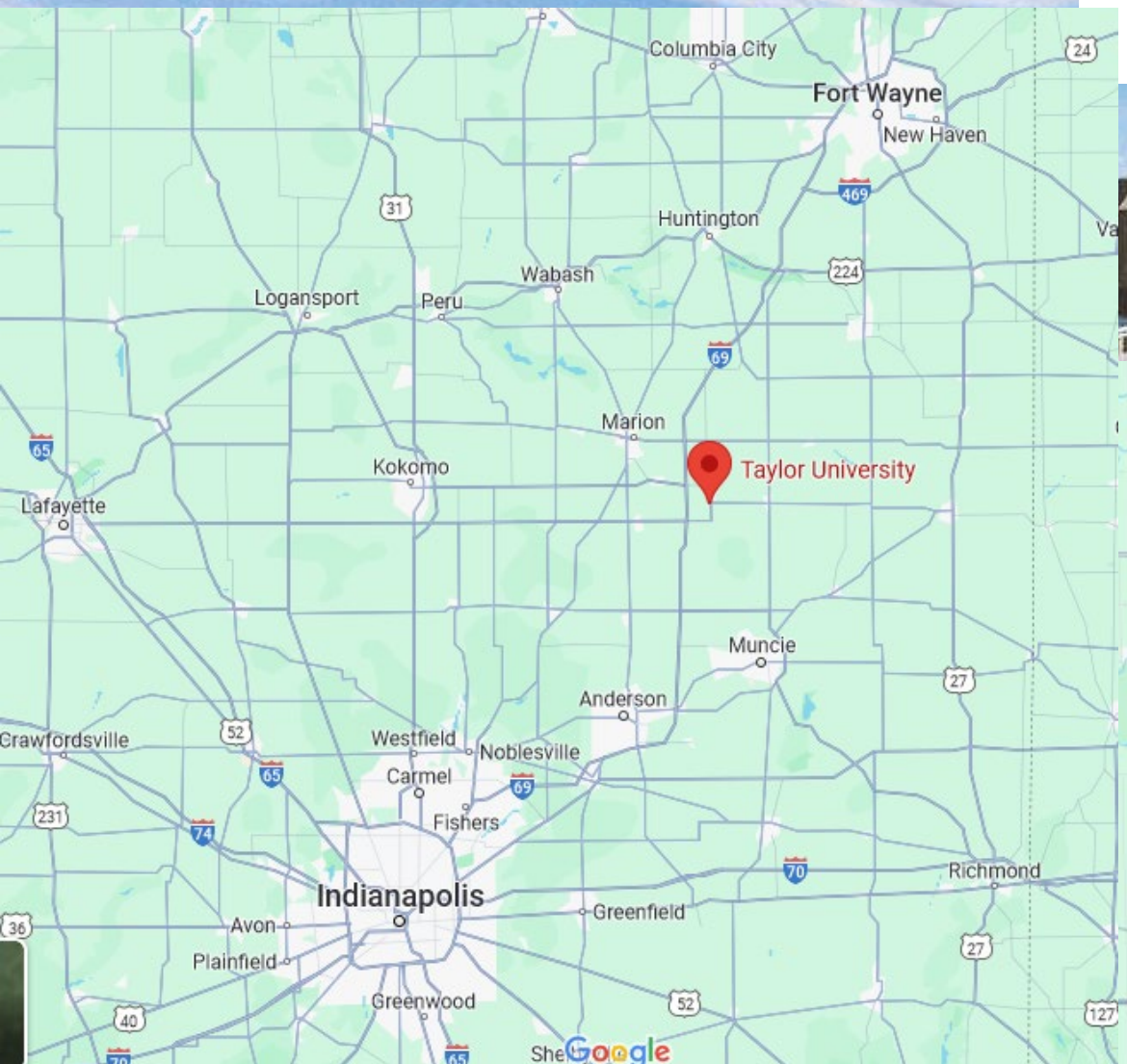
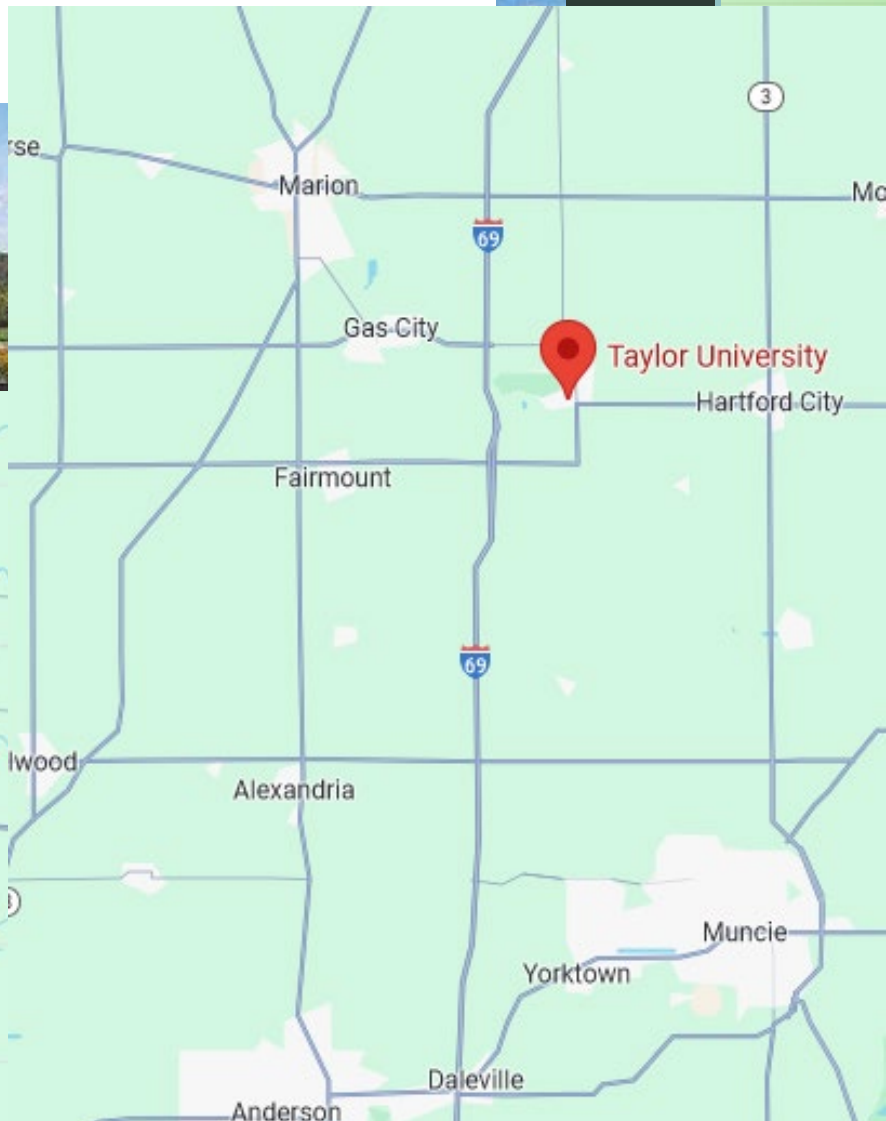




Taylor University Campus Garden

- Student research on environmental, economic and social aspects of local food systems.
  - ~ 1/10 acre of garden plots
  - 20+ young fruit trees
  - Aquaponic tilapia
  - 3 beehives
  - Layer hens

Full Circle Gardens

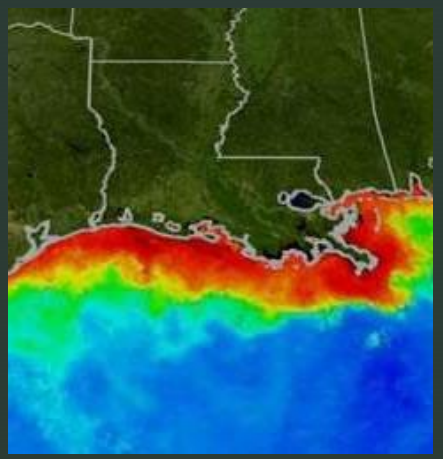
est. 2014

Christian Environmental Stewardship

- Lynn White Jr.'s essay in 1967 blamed the Judeo-Christian worldview for modernity's environmental problems, saying that Genesis 1 promotes human "dominion" of the Earth
- Christian ecologists and theologians responded explaining the misinterpretation of Genesis 1 (even by churches).
  - Godly dominion restrains selfishness (Deut. 17)
  - Genesis 2:15 The Lord God took the man and put him in the garden of Eden to work it and keep it (ESV) // to guard it and protect it (Stephen Bouma-Prediger)

Agriculture as we know it must change

Tillage leads to erosion



Fertilizer causes pollution

Monocropping lacks resilience

Pesticides harm humans and bees

Def. Produce can be called organic if it's certified to have grown on soil that had no prohibited substances applied for three years prior to harvest. Prohibited substances include most synthetic fertilizers and pesticides. (USDA)

- **No Insecticides**
  Alternatives: Neem Oil, Kaolin Clay, Netting
- **No Herbicides**
  Alternatives: Cardboard, Weed Fabric, Newspaper, Straw, Hand Weeding
- **No Synthetic Fertilizers**
  Alternatives: Liquid Fish, Kelp Extract, Effective Microorganisms, Manure, Compost

Raised Beds, Drip Irrigation, Weed Suppression, Organic Sprays and Soil Amendments

What are the most effective soil amendments for organic gardening?

1. “Composted manure” 13 cu. ft. (17 bags) per 40’ row (also added peat and lime)
2. Pelletized chicken manure only – 25 lbs. per 40’ row
3. Year 2 (2021) = half rate for both
4. Year 3 (2022) = half rate for both

Plot 1: Pelletized chicken manure $10 per 40 ft row

Plot 2: Compost, peat and lime; $43 per 40ft row

Garden Layout for 2021 Experiment

Plot 1	Tomatoes		
	Beans	Peppers	Kale & Collard Greens
	Onions	Cucumbers	Onions
	Squash & Zucchini		
Plot 2	Tomatoes		
	Beans	Peppers	Kale & Collard Greens
	Onions	Cucumbers	Onions
	Squash & Zucchini		

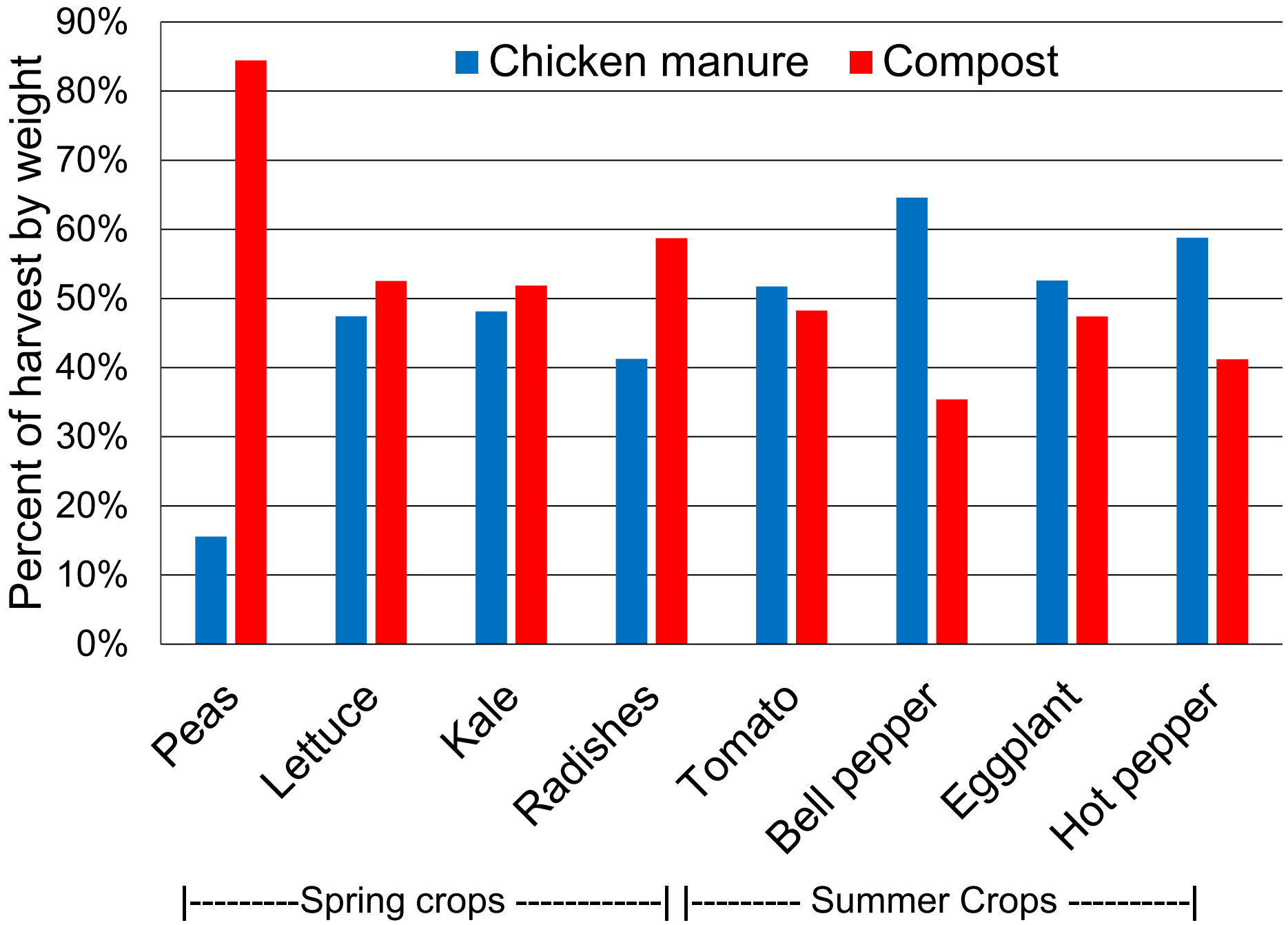
Methods

- Weigh all produce – separate for each crop and variety
- Record observations about growth and pests
- Active management to reduce pests and prune plants

2022 data:

1. Benefits from compost last longer.

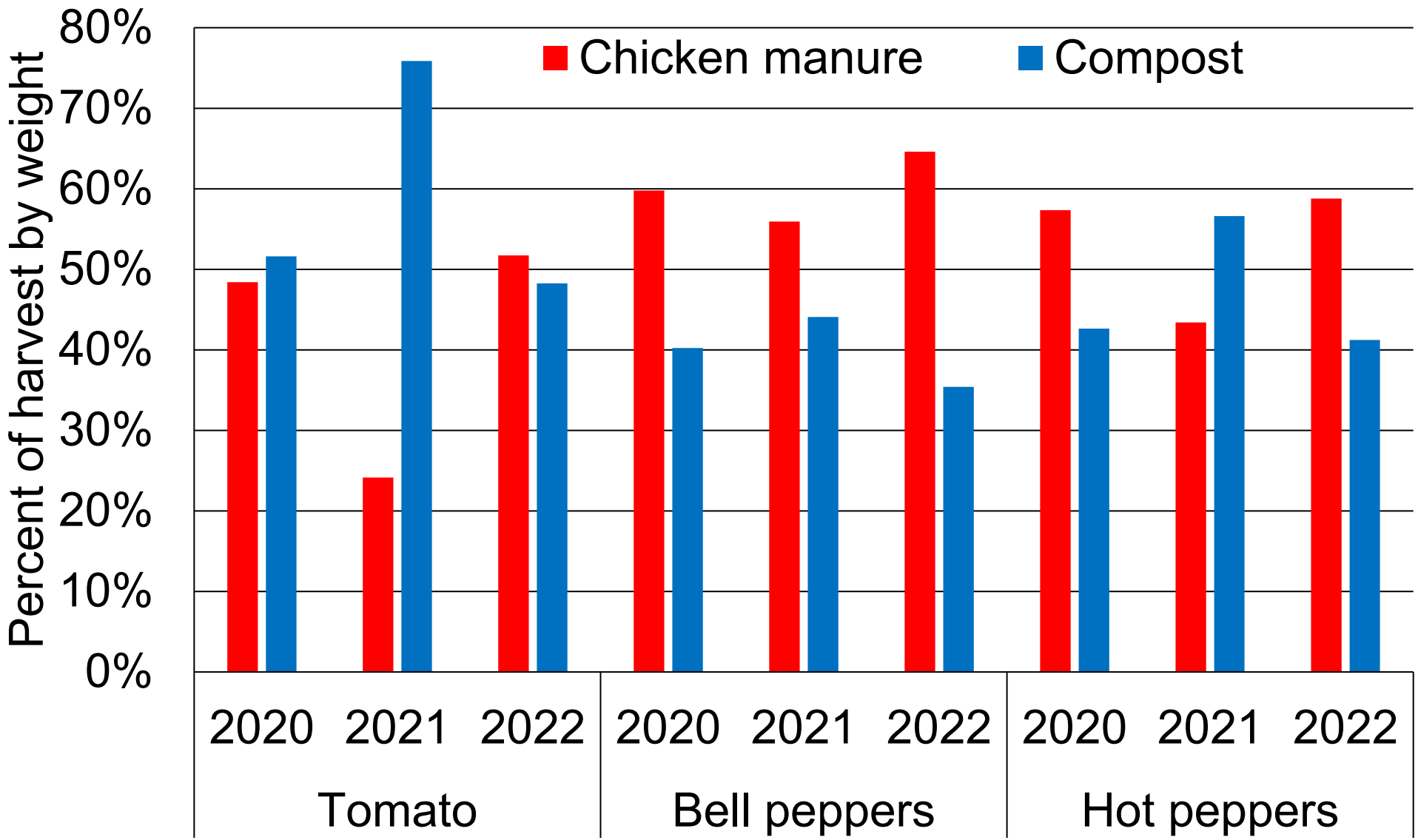
2. Chicken manure provides more nutrients.



Three-year comparison of production

1. Peppers better w/ chicken manure.

2. Tomato yield depends on rain (flooding in 2021).



Soil as the basis for all of life

O Horizon: Humus (surface litter, decomposing plant matter)

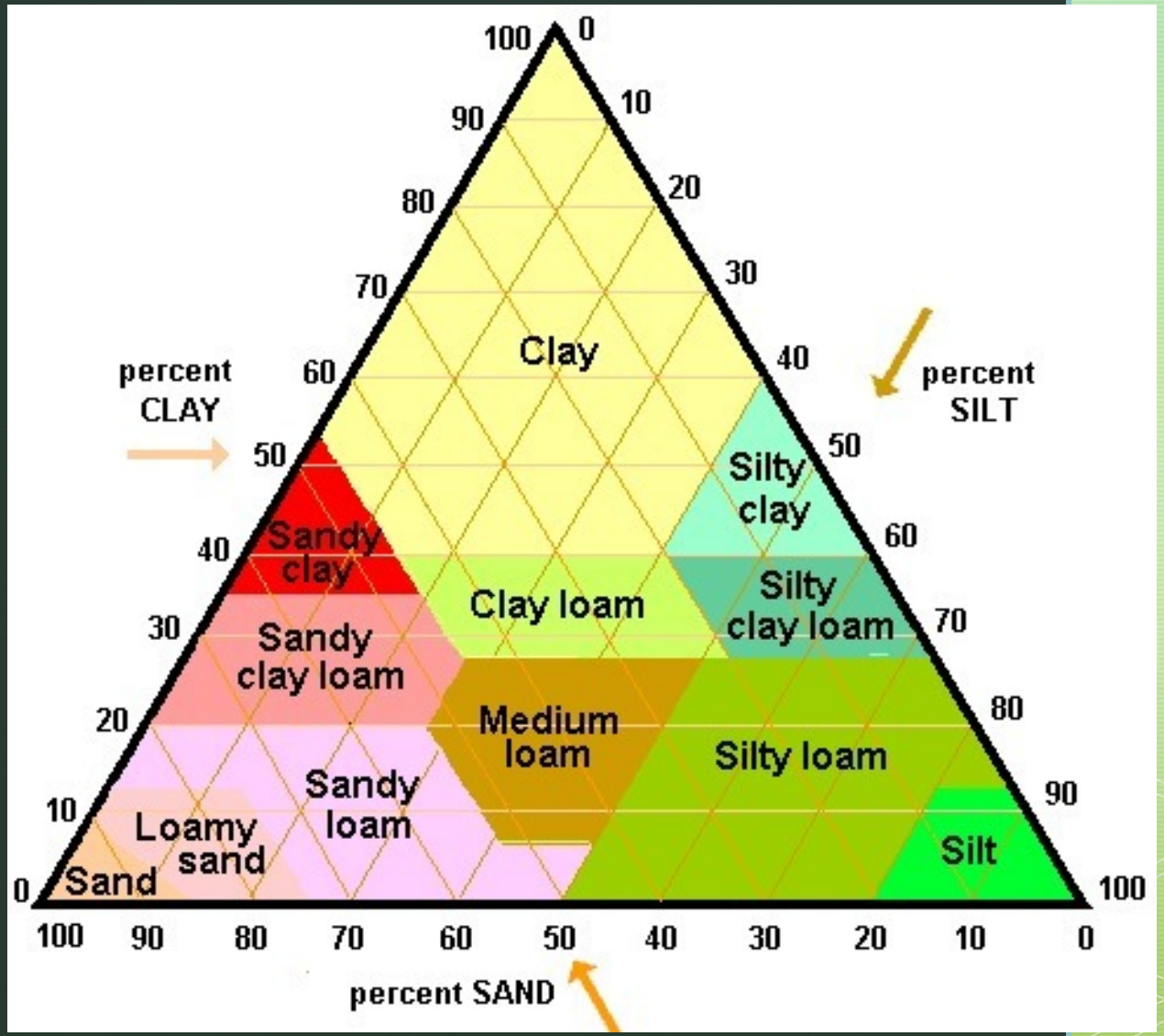
A Horizon: Topsoil (mixed humus and leached mineral soil)

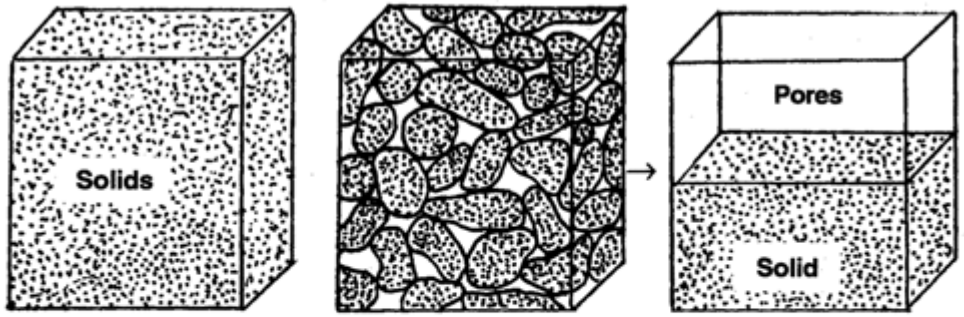
E Horizon: Zone of leaching (less humus, minerals resistant to leaching)

B Horizon: Subsoil (accumulation of leached minerals like iron and aluminum oxides)

C Horizon: Weathered parent material (partly broken-down minerals)

Figure 11–5 Soil profile. This idealized soil profile shows the major horizons from the surface to the parent material.





Bulk density differences across soil treatments

- Typically 1-1.6 grams per cubic centimeter
- Professor Reber's soil science class (Spring 2022) sampled a soil core 5-10cm below the surface
- Chicken manure = 1.45
- Composted manure = 1.14
- Prairie restoration = 1.38
- ANOVA was statistically significant

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Garden (C)	8	11.60664	1.45083	0.005819		
Garden (M)	8	9.132854	1.141607	0.008167		
Prairie	8	11.03374	1.379217	0.002384		
ANOVA						
ırce of Variati	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Gro	0.419216	2	0.209608	38.41441	9.63E-08	3.4668
Within Group	0.114586	21	0.005456			
Total	0.533802	23				

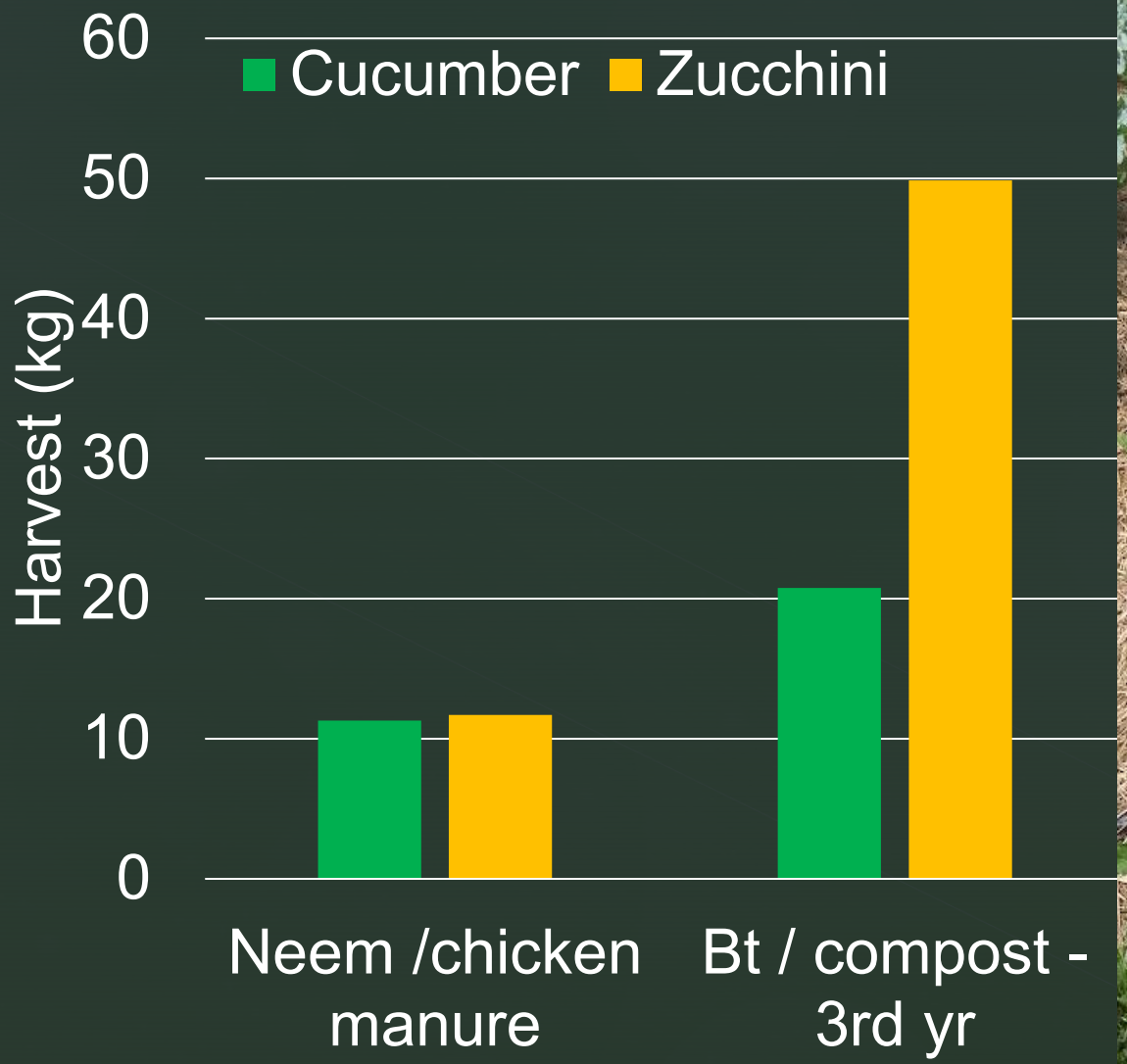

Taylor
TROJANS
2018

Hand picking eggs, juveniles and adult Squash Bugs

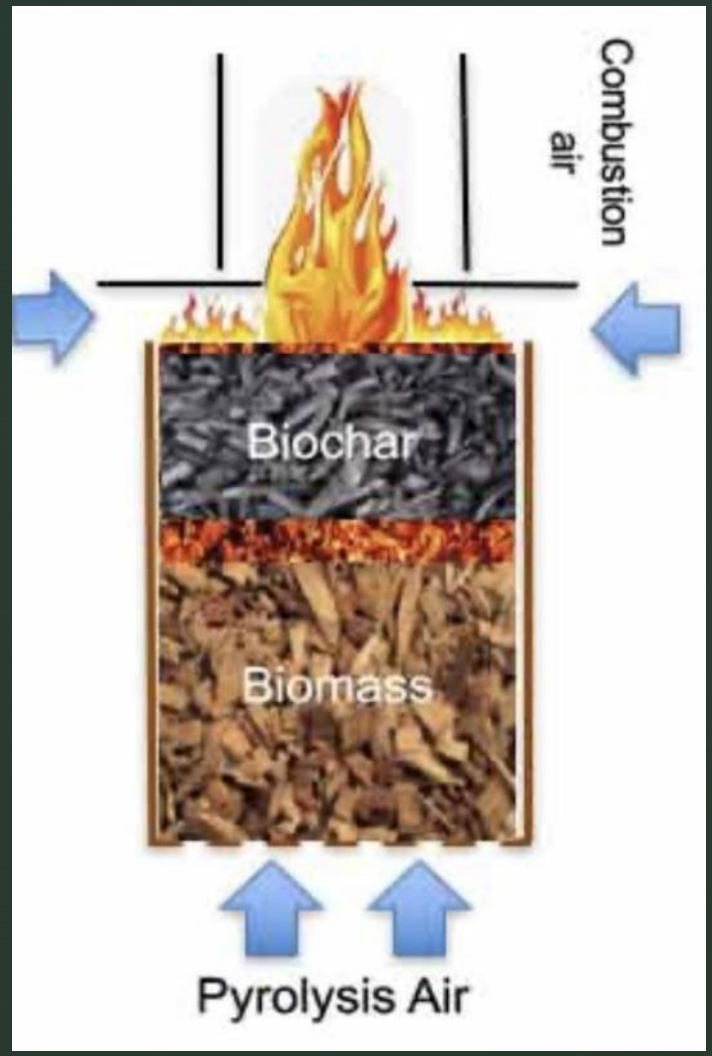
https://www.canr.msu.edu/news/squash_bugs_as_pests_of_cucurbits_in_michigan

Organic sprays: enhance microbial diversity, control insects and provide nutrients to plants

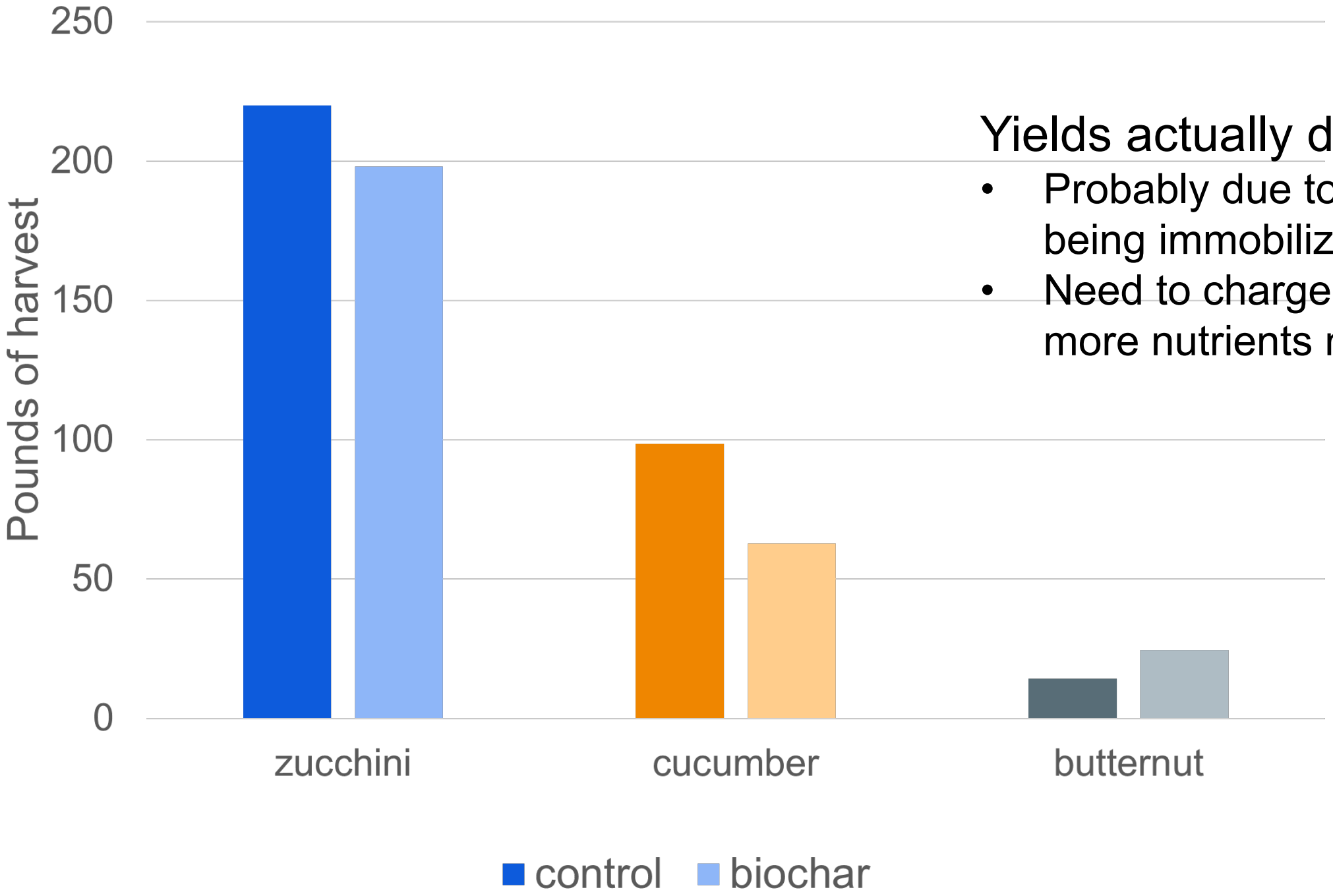
Plant Surgery to remove Squash Vine Borer larvae


60
50
40
30
20
10
0
Harvest (kg)
Cucumber
Zucchini
Neem /chicken manure
Bt / compost - 3rd yr

Biochar from woodchips – Top Lit Updraft

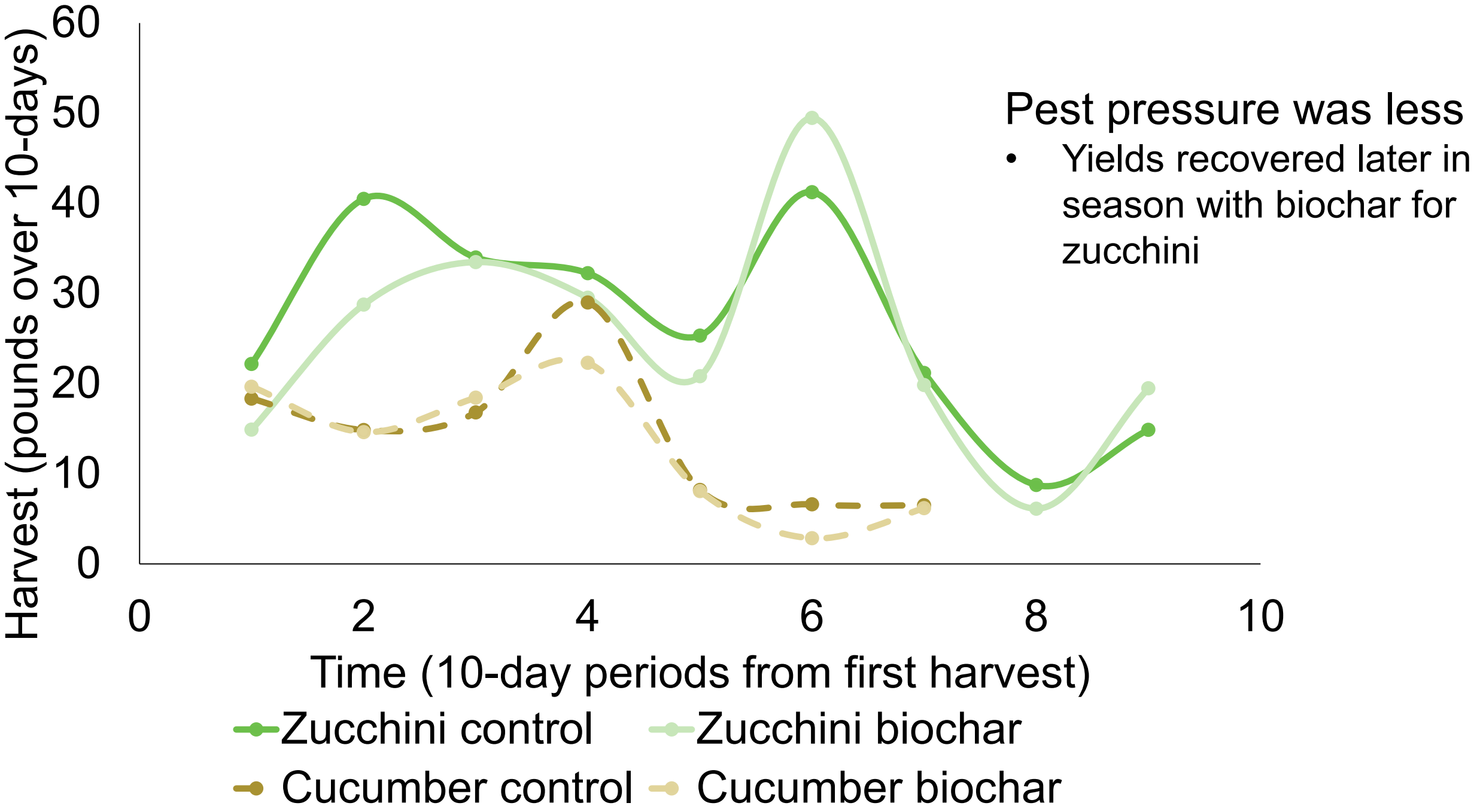


Inoculated with “compost tea” and charged with “liquid fish”



Yields actually declined

- Probably due to nitrogen being immobilized
- Need to charge it with more nutrients next time


Harvest (pounds over 10-days)
60
50
40
30
20
10
0
0
2
4
6
8
10
Time (10-day periods from first harvest)
Zucchini control
Zucchini biochar
Cucumber control
Cucumber biochar
Pest pressure was less
• Yields recovered later in season with biochar for zucchini

Upland Farmers' Market and Randall produce stand

Discussion – Building soil for healthy food

Composting campus food waste

Vermicomposting

Service learning to address local food insecurity

Thriving Grant County
Thriving Mill Township

- IDOH local food summit 2022

- Upland community garden

SECOND HARVEST
food bank

Next steps?

- Industrial composting could move Taylor towards zero waste – already owns land for it
- Community recycling IDEM grant?
- $30 Million from Lilly Foundation for economic development (Main St. Mile)