

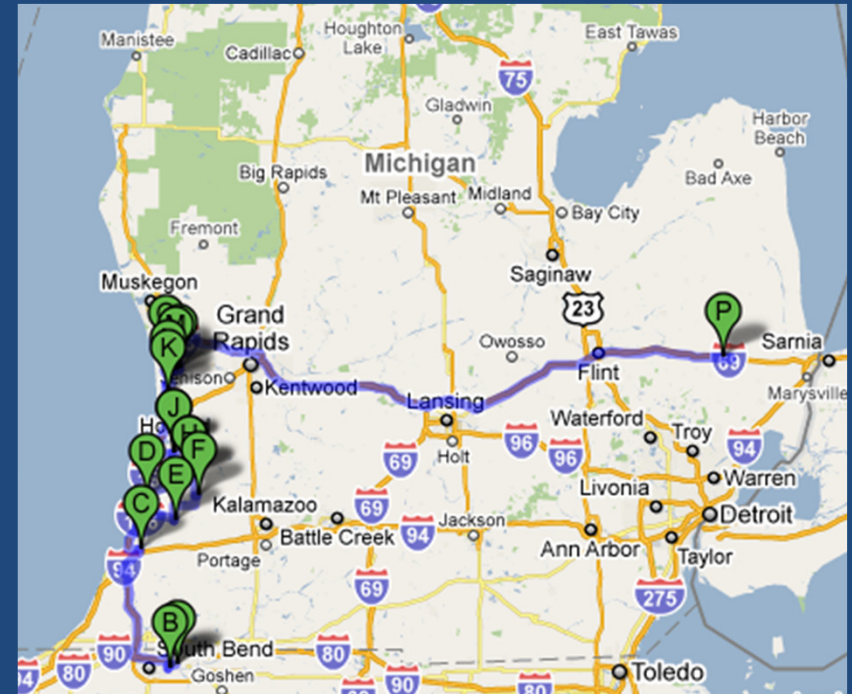
Carbon and nutrient cycling and beneficial microorganisms in organic and conventional blueberry soils in Michigan



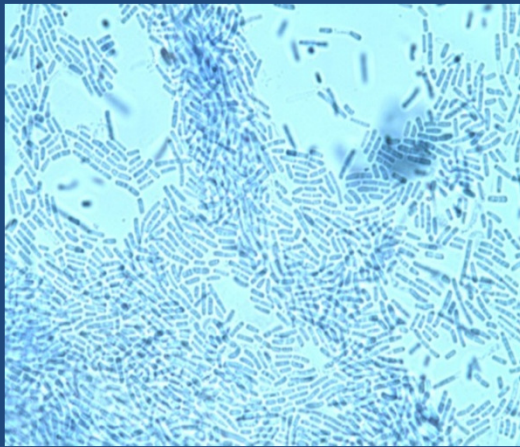
Jesse Sadowsky, Jianjun Hao, and Annemiek Schilder,
Department of Plant Pathology
Eric Hanson, Department of Horticulture
Stuart Grandy, Department of Crop and Soil Sciences

Conventional and organic farm survey

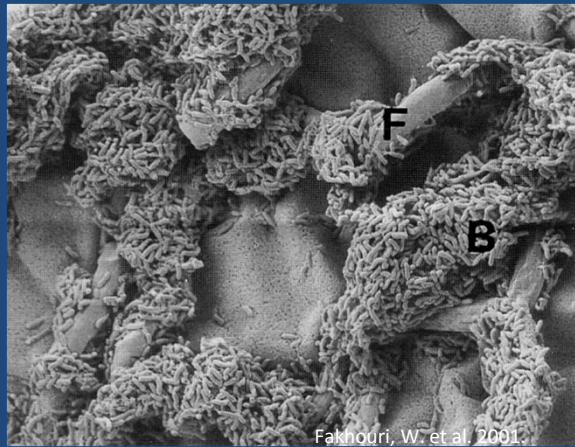
- Plant health and soil biology – how are organic farms different?
- Mycorrhizal colonization as related to biological soil parameters
- Investigation into the biology of Michigan blueberry soils



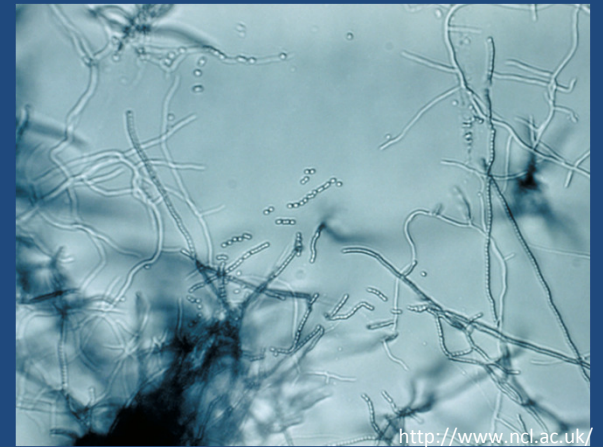
Beneficial microbes and root symbioses



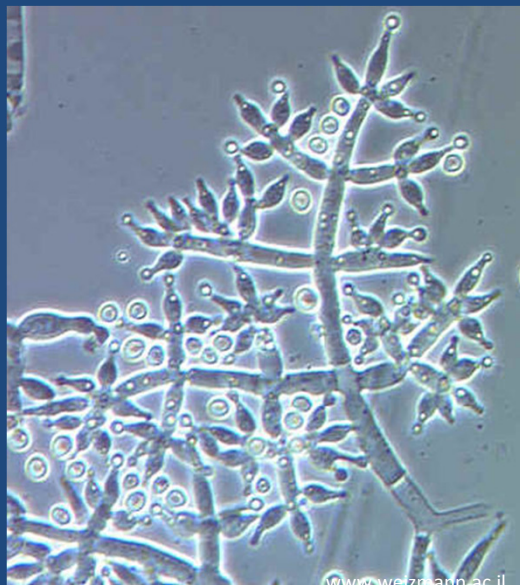
Bacillus spp.



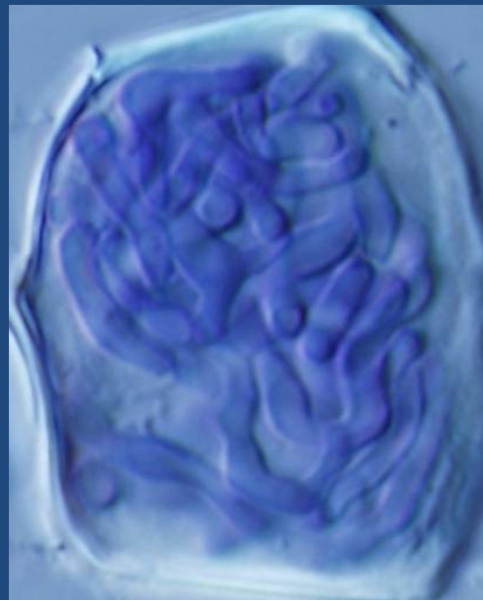
Fluorescent *Pseudomonas* spp.



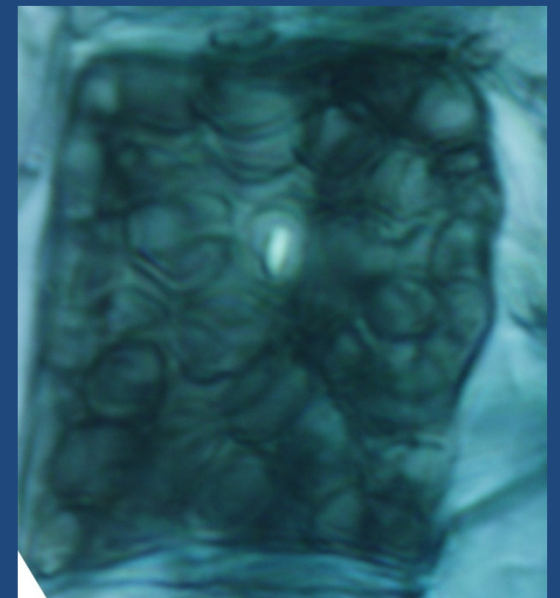
Streptomyces spp.



Trichoderma spp.



Ericoid mycorrhizae



Dark septate endophytes

Biological soil measurements

Enzyme assays



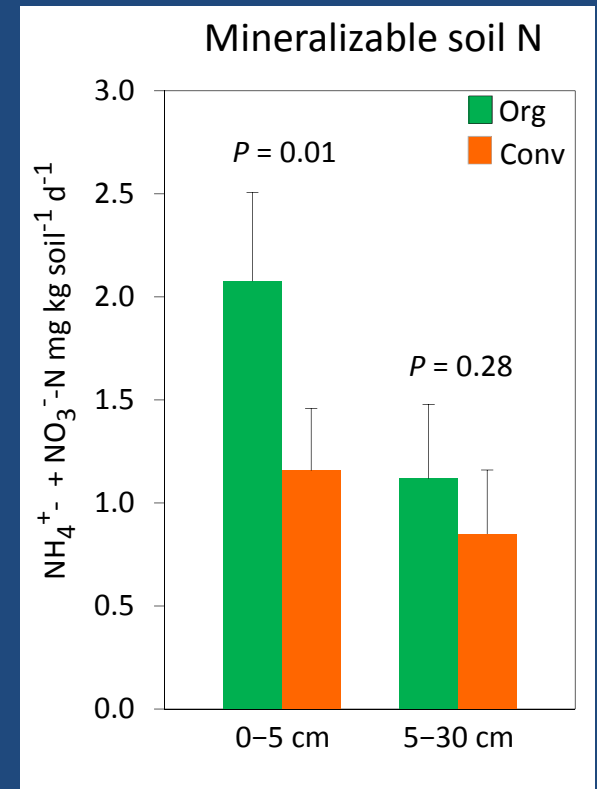
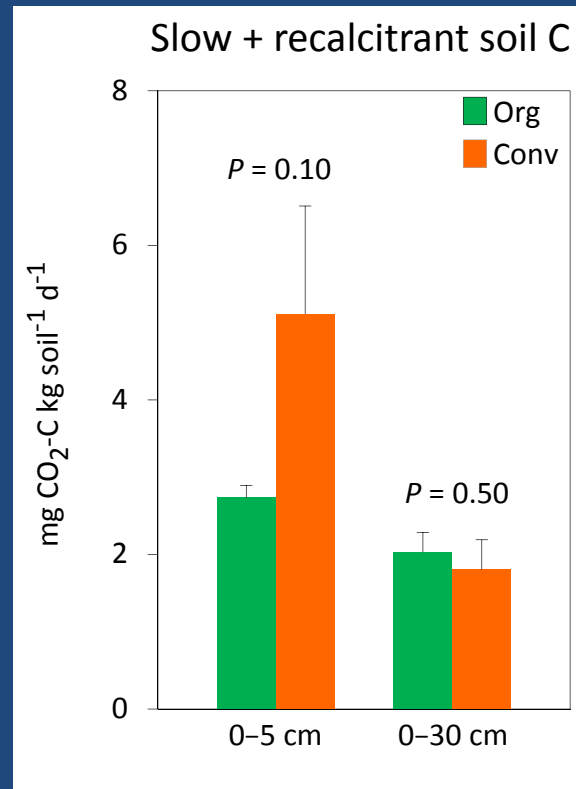
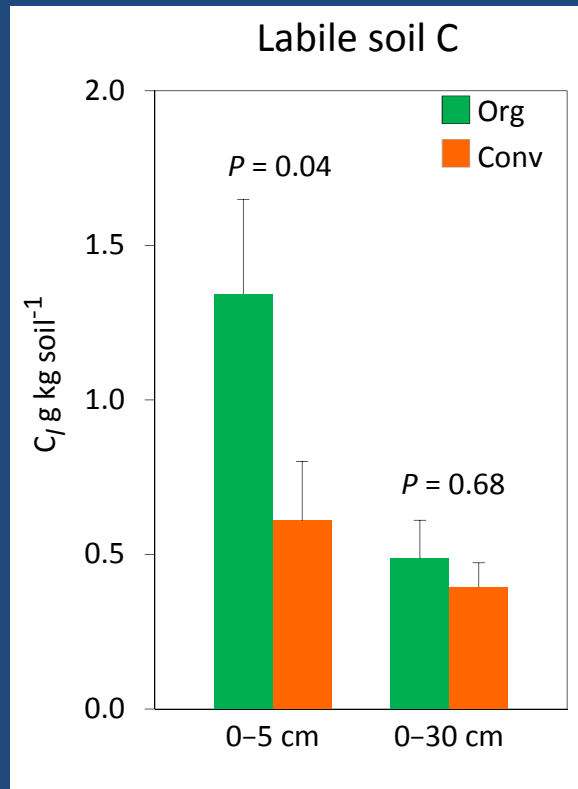
Light fraction SOM



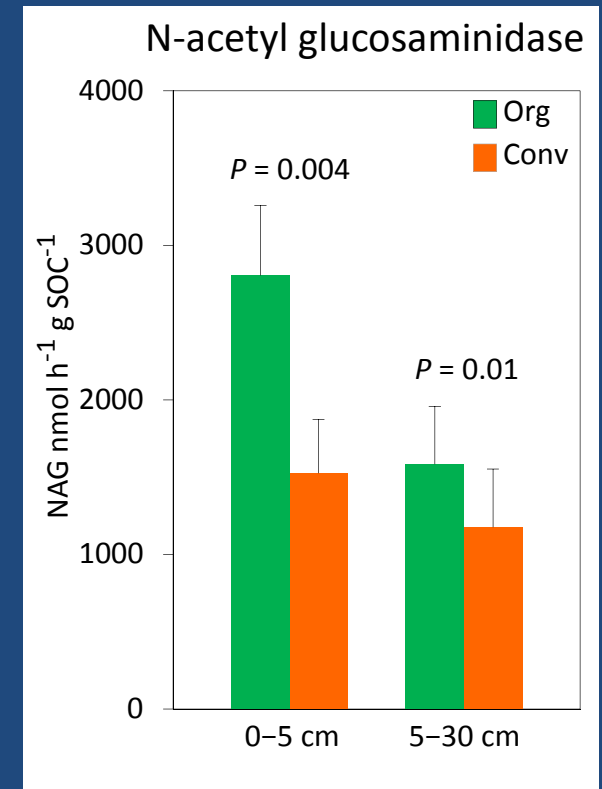
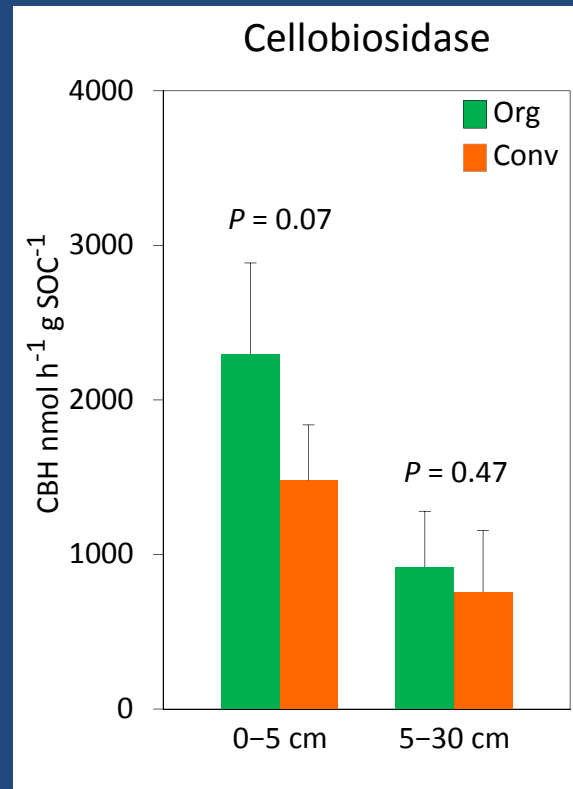
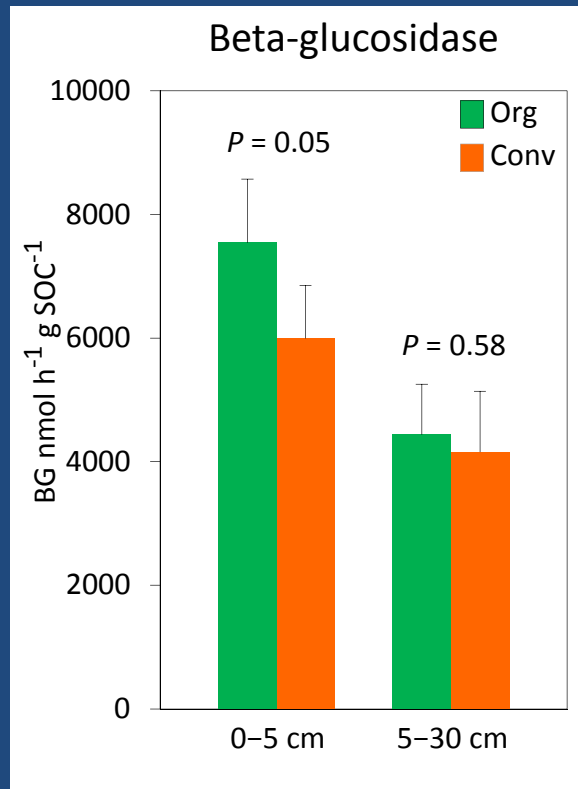
Potential carbon and nitrogen mineralization



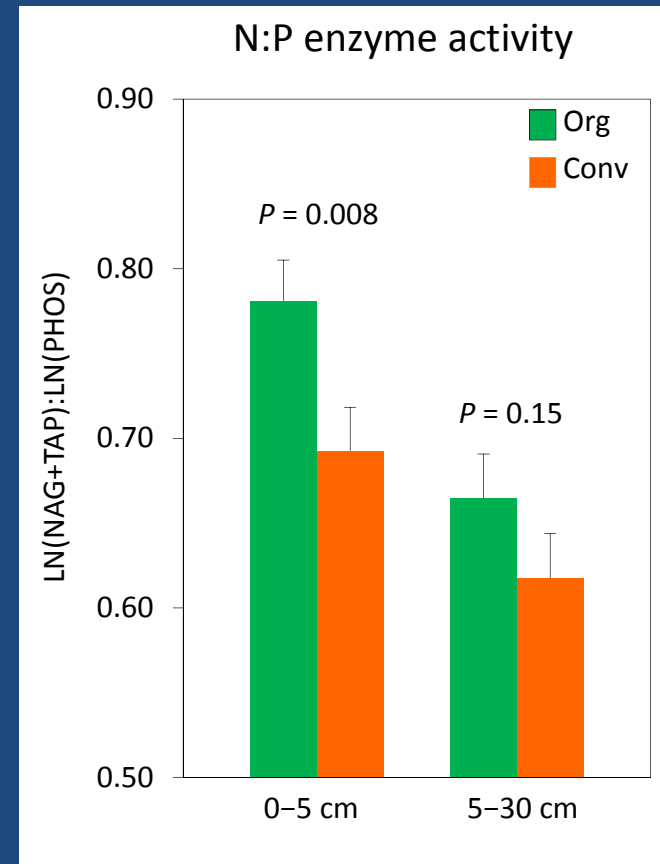
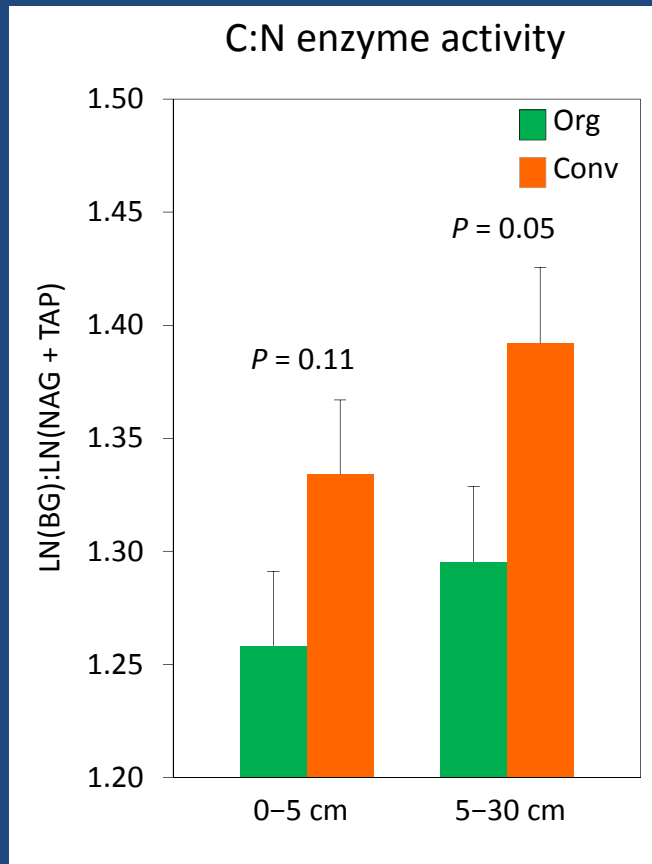
Labile and slow-cycling soil C and N pools



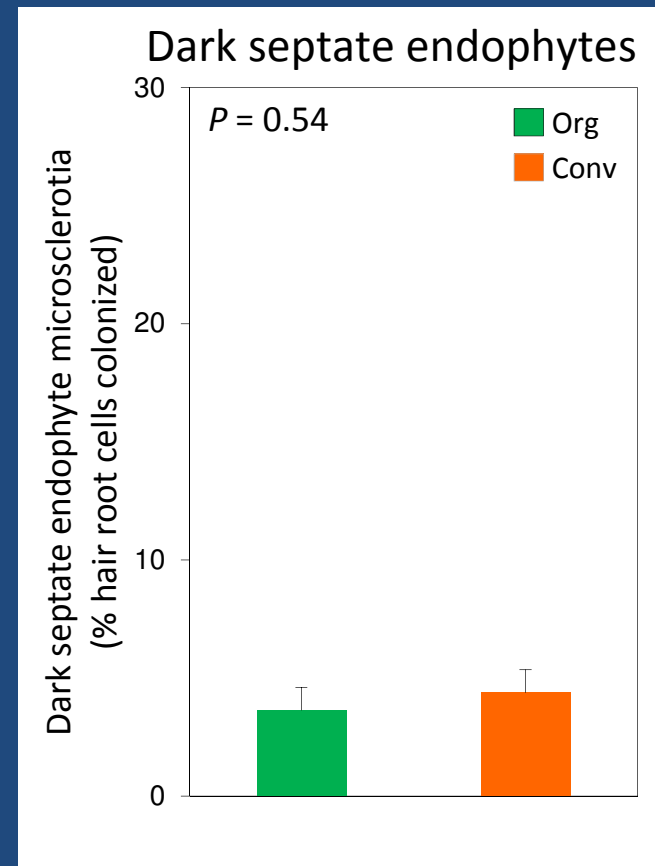
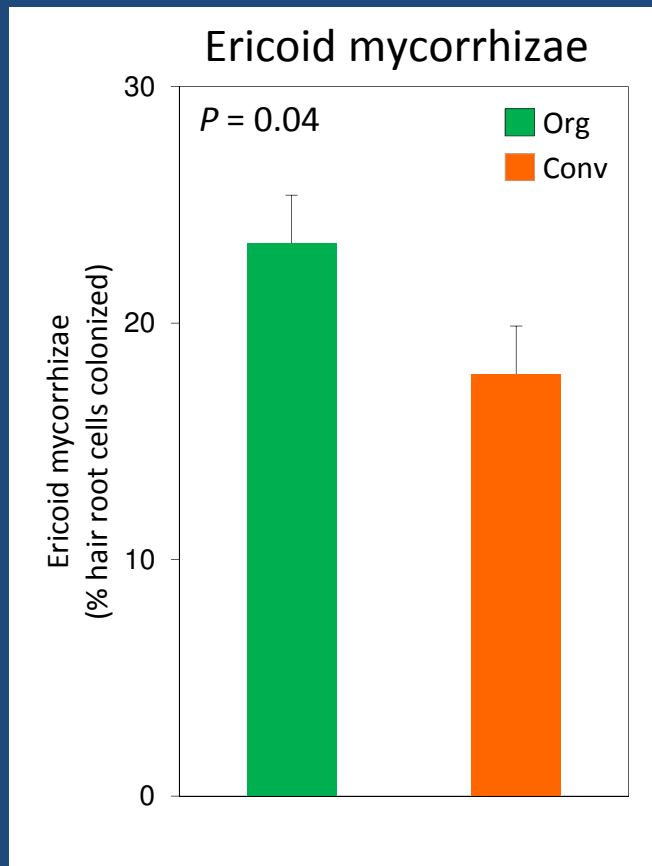
Soil enzyme activity



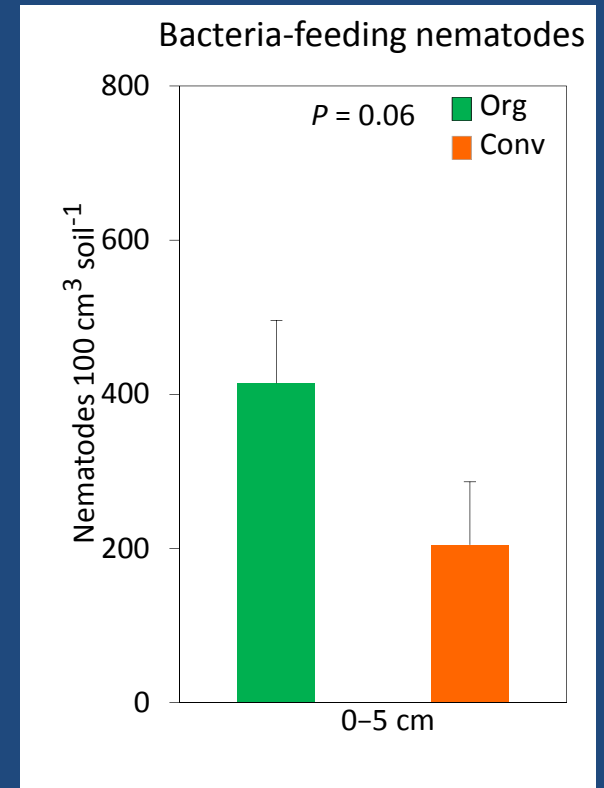
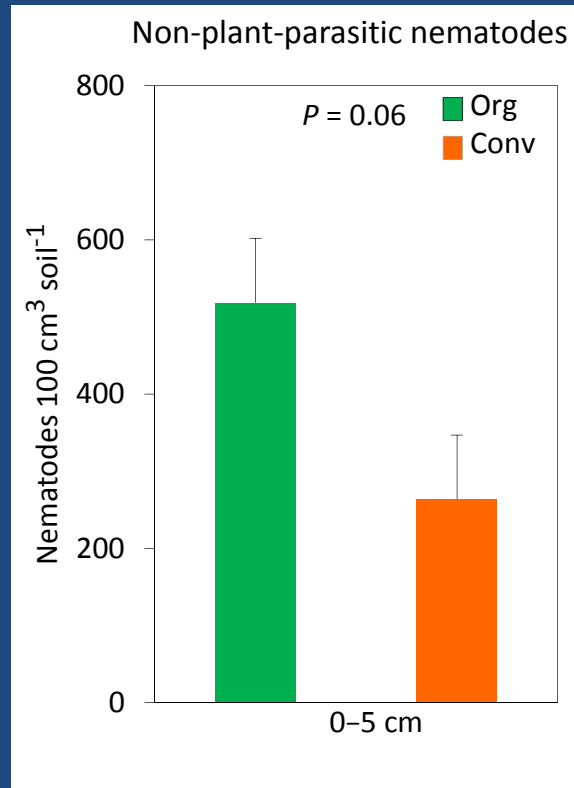
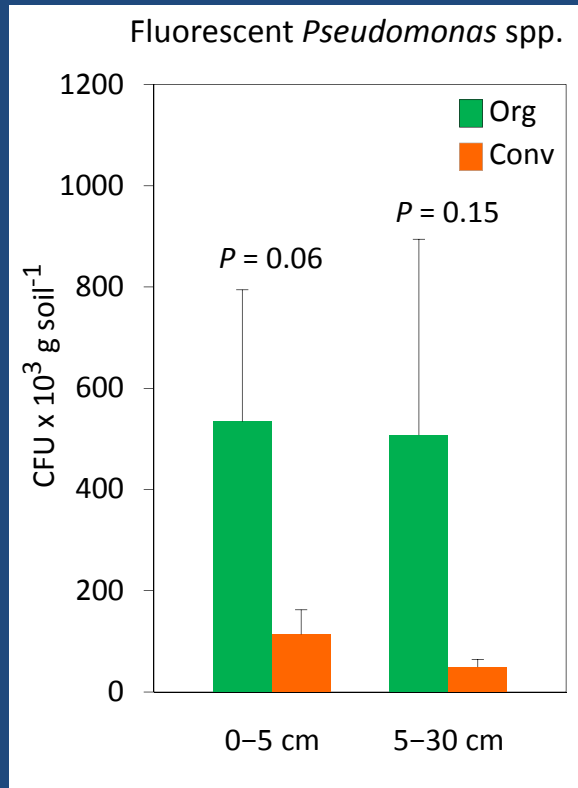
Allocation of C, N, and P soil enzymes



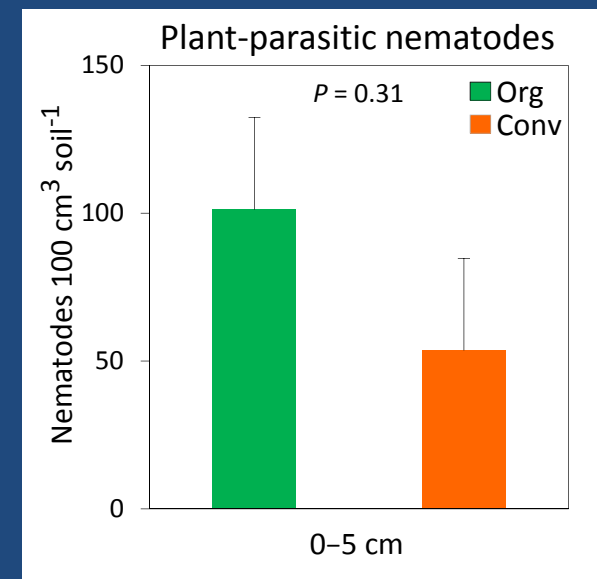
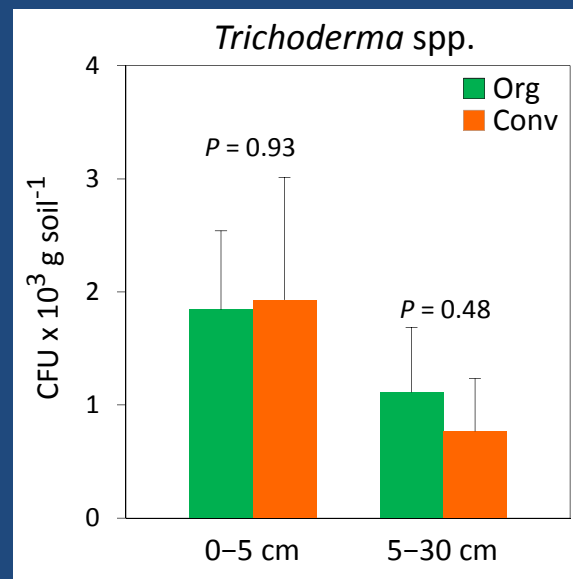
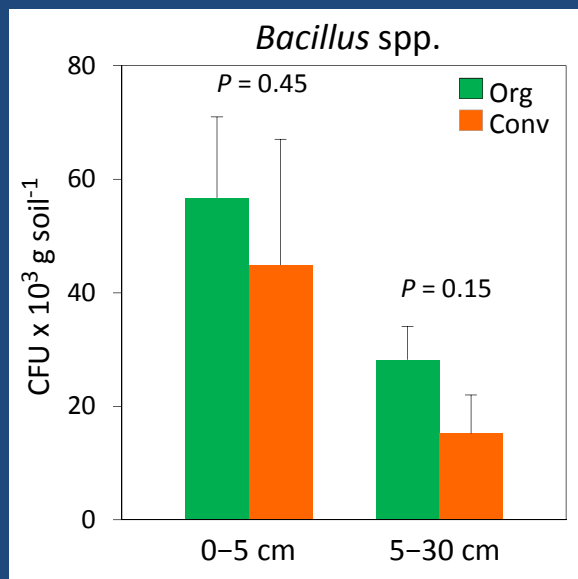
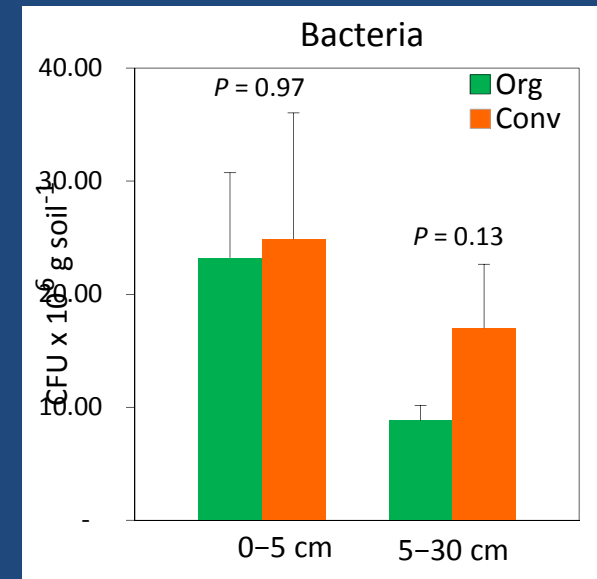
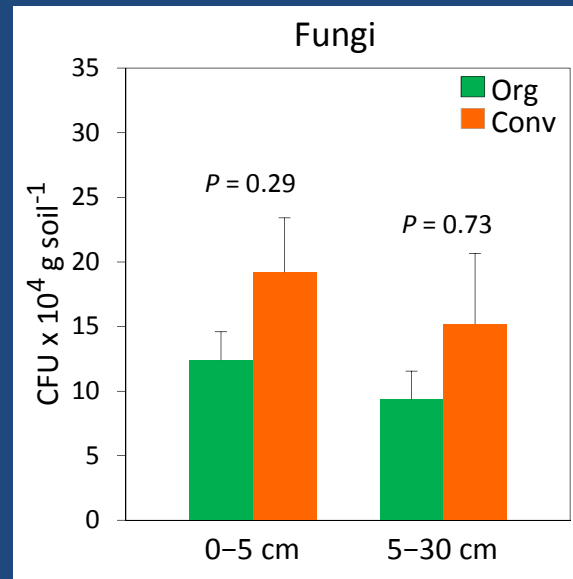
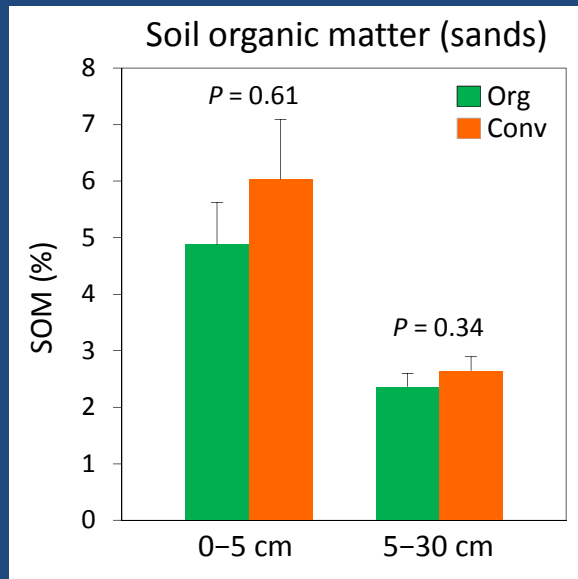
Root colonization by symbiotic fungi



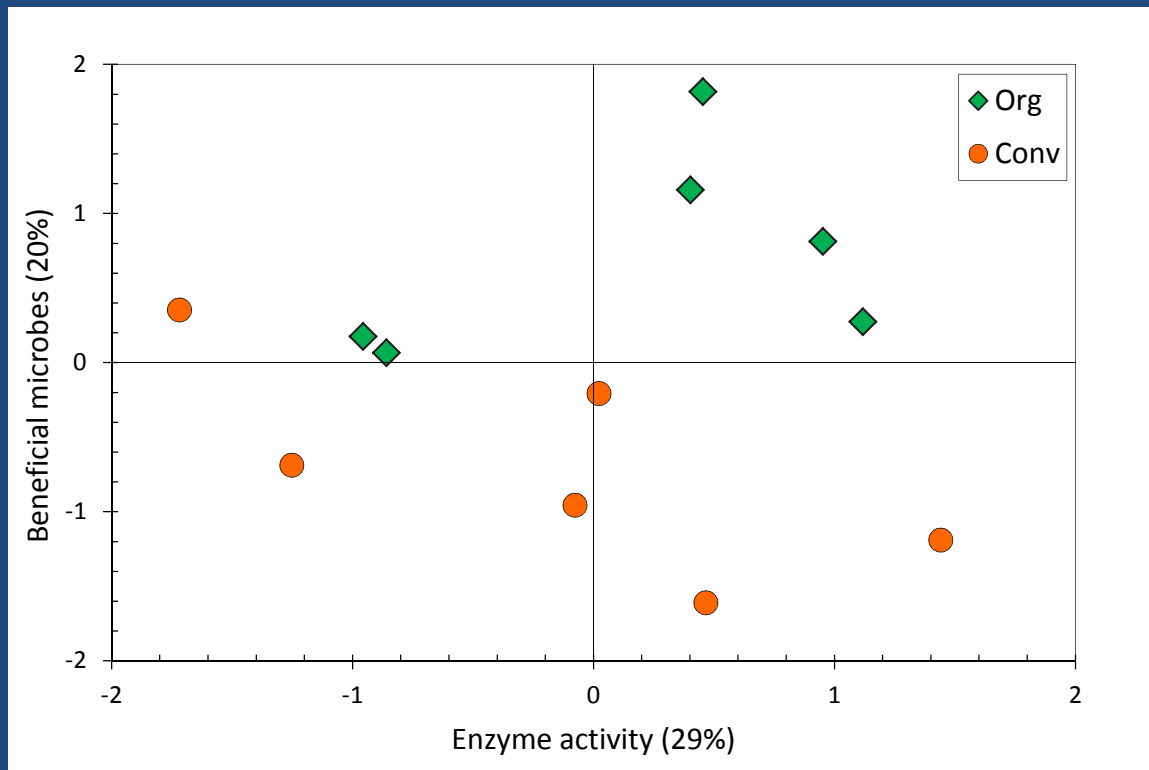
Beneficial soil microbes



Not significantly affected by management

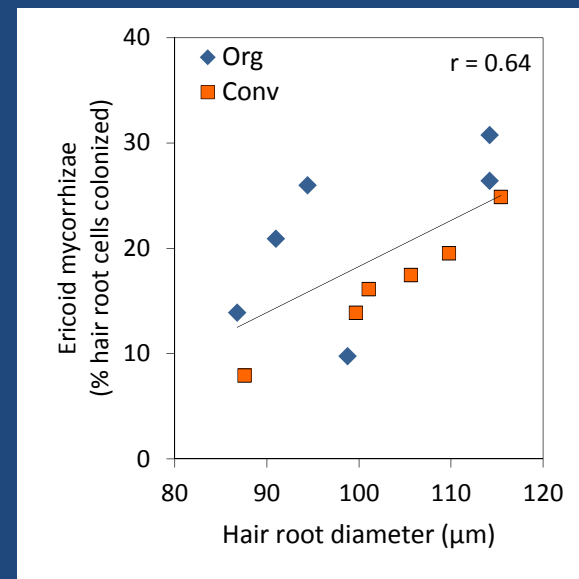
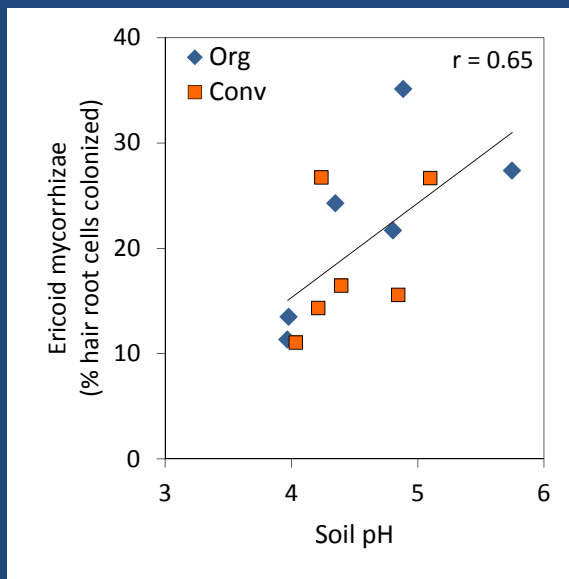
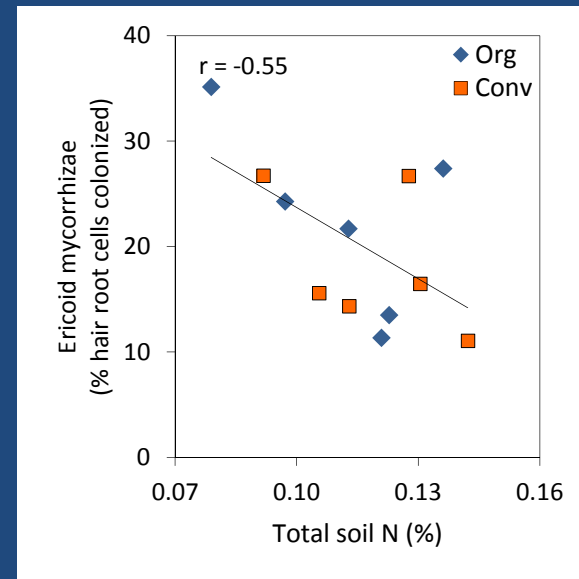
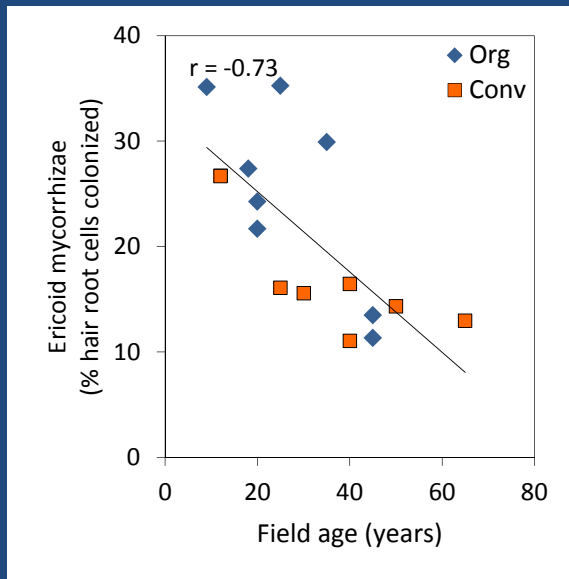


Principal component analysis – Biological soil variables



	Factor 1	Factor 2
H ₂ O	-0.05	-0.21
NAG	0.86*	0.17
BG	0.98*	-0.05
CBH	0.95*	-0.03
PHOS	0.51*	-0.67*
POX	-0.04	0.10
PER	0.83*	-0.14
TAP	0.38	-0.67*
CO ₂	0.82*	0.09
Bacteria	-0.06	0.78*
Streptomyces	0.17	0.75*
Pseudomonas	0.20	0.47*
Bacillus	0.24	0.82*
Fungi	-0.54*	0.21
Trichoderma	0.15	0.15
ERM	-0.35	0.49*
DSE	0.16	0.18

Correlations mycorrhizal colonization and field characteristics on sandy soils



Fruit rot incidence

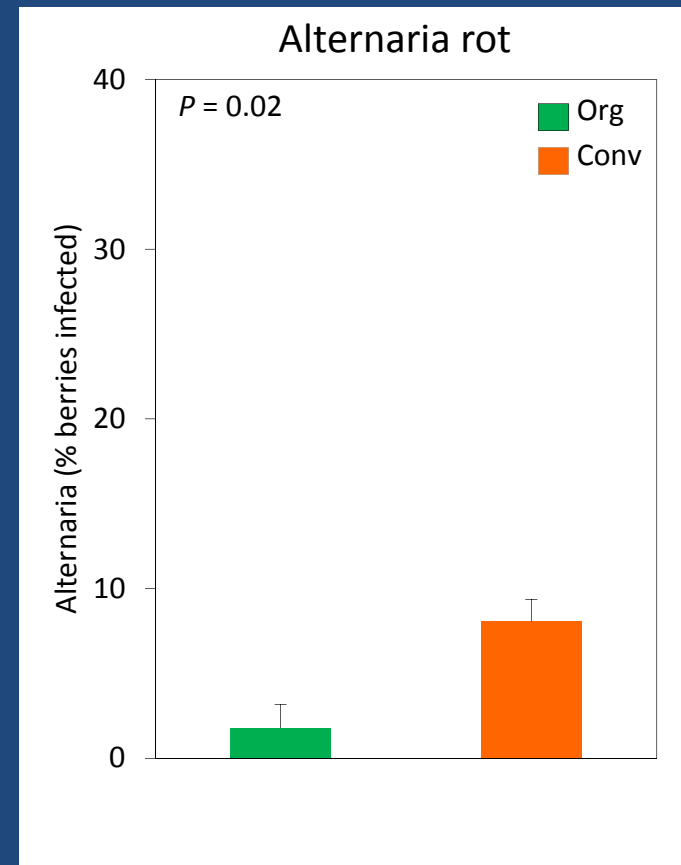
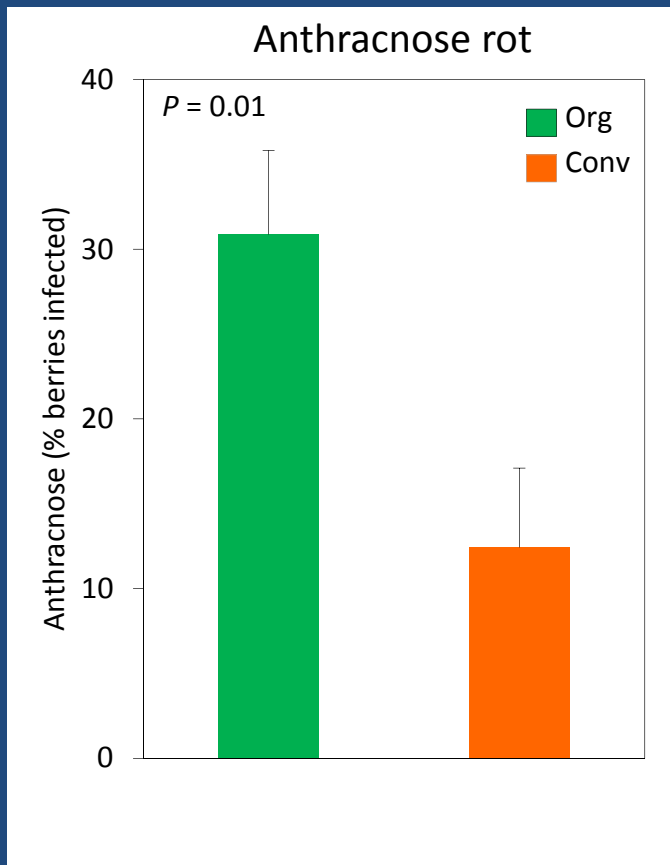


Anthracnose



Alternaria

Fruit rot disease incidence



Conclusion

1. Organic management promotes mycorrhizal colonization, labile soil C and N cycling, carbohydrase and chitinase enzyme activity and populations of fluorescent pseudomonads and bacterium-feeding nematodes
2. Microbes allocate more enzyme activity towards nitrogen acquisition in organically managed soils and carbon and phosphorus acquisition in conventional soils
3. Mycorrhizal colonization of blueberries is positively correlated with soil pH and hair root diameter in Michigan and negatively correlated with field age and total soil nitrogen
4. Anthracnose fruit rot incidence is higher in organic blueberries

Funding provided by:

