CLIMATE COLLABORATIVE™

Commit. Act. Impact.

Organic vs. Climate Change

Organic's Role in Combating Climate Change

29. September. 2017

CLIMATE COLLABORATIVE™

Commit. Act. Impact.

a project of

ONE STEP CLOSER 2 OSC Organic Sustainable Community

Sustainable Food Trade Association
organic leaders for sustainability

Our industry can and must respond to climate change.

Make a commitment to climate in one or more areas!

Integrate carbon farming into the agricultural supply chains

Increase energy efficiency

Reduce food-waste in the supply chain

Remove commodity-driven deforestation from supply chains

Responsible engagement in climate policy

Reduce the climate impact of packaging

Commit to 100% renewable power

Reduce short-lived climate pollutant emissions

Reduce climate impacts of transportation

www.climatecollaborative.com/take_action

Our Impacts

124
COMMITTED COMPANIES

↑ 43% since August!

↑ 44% since August!

490
COMMITMENTS

8 Companies committed to all 9 Areas

1ST CLIMATE DAY

500+ ATTENDEES

1,500+ LIVESTREAM AUDIENCE

6,350 *Views of the Climate Day Video*

Made possible by these generous donors!

Climate Collaborative Catalysts

New Hope NETWORK

National Co+op Grocers

Climate Collaborative Champions

Happy Family Organics

Presence
PRESENCE MARKETING DYNAMIC PRESENCE

Annie's

INFRA

Organic Valley

Dr. Bronner's ALL-ONE!

Climate Collaborative Leaders

Guayaki Organic Yerba Mate

Nature's Path Organic

Stonyfield Organic

WhiteWave

Lotus Foods Rice is Life

REBBL

Plum organics

Climate Collaborative Allies

Alter Eco

Califia Farms

etk

Lundberg Family Farms

Natural Habitats

Numi Organic Tea

nutiva Nurture Vitality

Organic India

Stahlbush Island Farms

Studio Fab

CLIMATE COLLABORATIVE™

Commit. Act. Impact.

Please take our <1 minute Post Webinar Survey!

facebook.com/climatecollaborative

@ClimateColl
#climatecollaborative

www.climatecollaborative.com

a project of

OSC² One Step Closer — Organic Sustainable Community

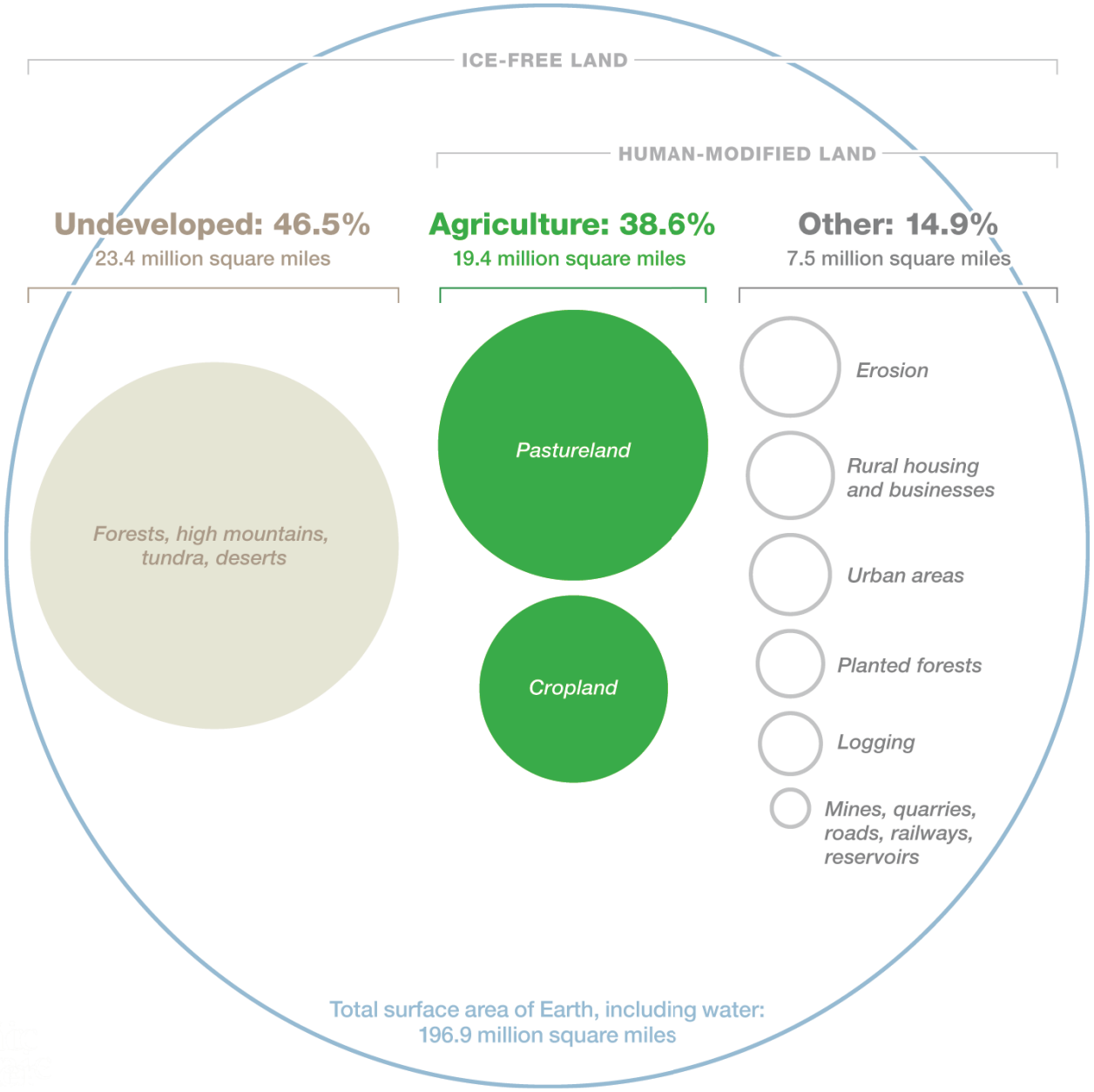
Sustainable Food Trade Association — organic leaders for sustainability

Our Speakers

Moderator: **Lisa Spicka**
Associate Director
SFTA

Dr. Tracy Misiewicz
Associate Director of Science Programs
The Organic Center

1. Why consider agriculture?
2. Organic farming and climate change mitigation
3. New research preview



FEEDING THE WORLD

- 40% of Earths ice-free surface is used for agricultural production
- 330 million acres in the U.S.

Legend Anthromes (v2), Ellis et al. 2010

Range and Cropland

Seminatural and Wild

Agriculture and Climate Change

- Food systems contribute 19% - 29% of global anthropogenic GHG emissions
- Agricultural production, including indirect emissions, contributes to 80% -86% of total food system emissions

Vermeulen et al. 2012

Two sides of the same coin

- Increase or reduce greenhouse gas emissions
- Release or sequester carbon in the soil

GHG emissions

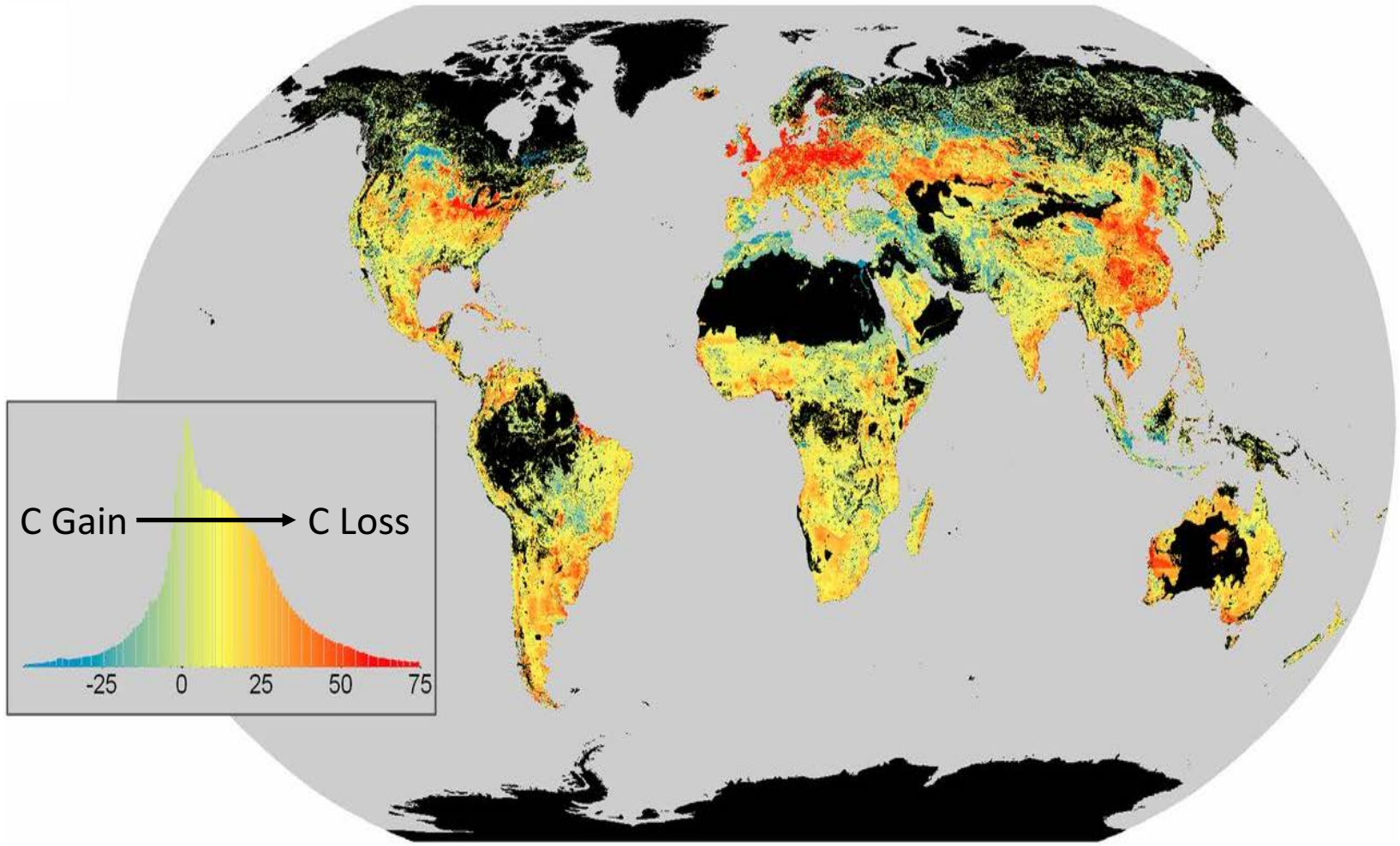
Direct emissions

- On-farm fossil fuel combustion
- Methane release
- Nitrous oxide release

Indirect emissions

- Carbon release from land conversion
- Fossil fuel use for manufacture and transport of on-farm inputs

Carbon Loss in the Top Two Meters of Soil



PNAS

Soil Carbon

Global loss of soil carbon

- Article published in PNAS shows carbon debt
- 133 billion metric tonnes of carbon lost worldwide in the top 2 meters of soil
- Rate of loss increasing dramatically over the last 200 years

Sanderman et al. 2017

Conventional Agriculture

- Synthetic fertilizer
- Little recycled organic matter
- Synthetic pesticide use

Organic Agriculture

Climate friendly practices

- Fallowing

Organic Agriculture

Climate friendly practices

- Fallowing
- Crop rotation


Organic Agriculture

Climate friendly practices

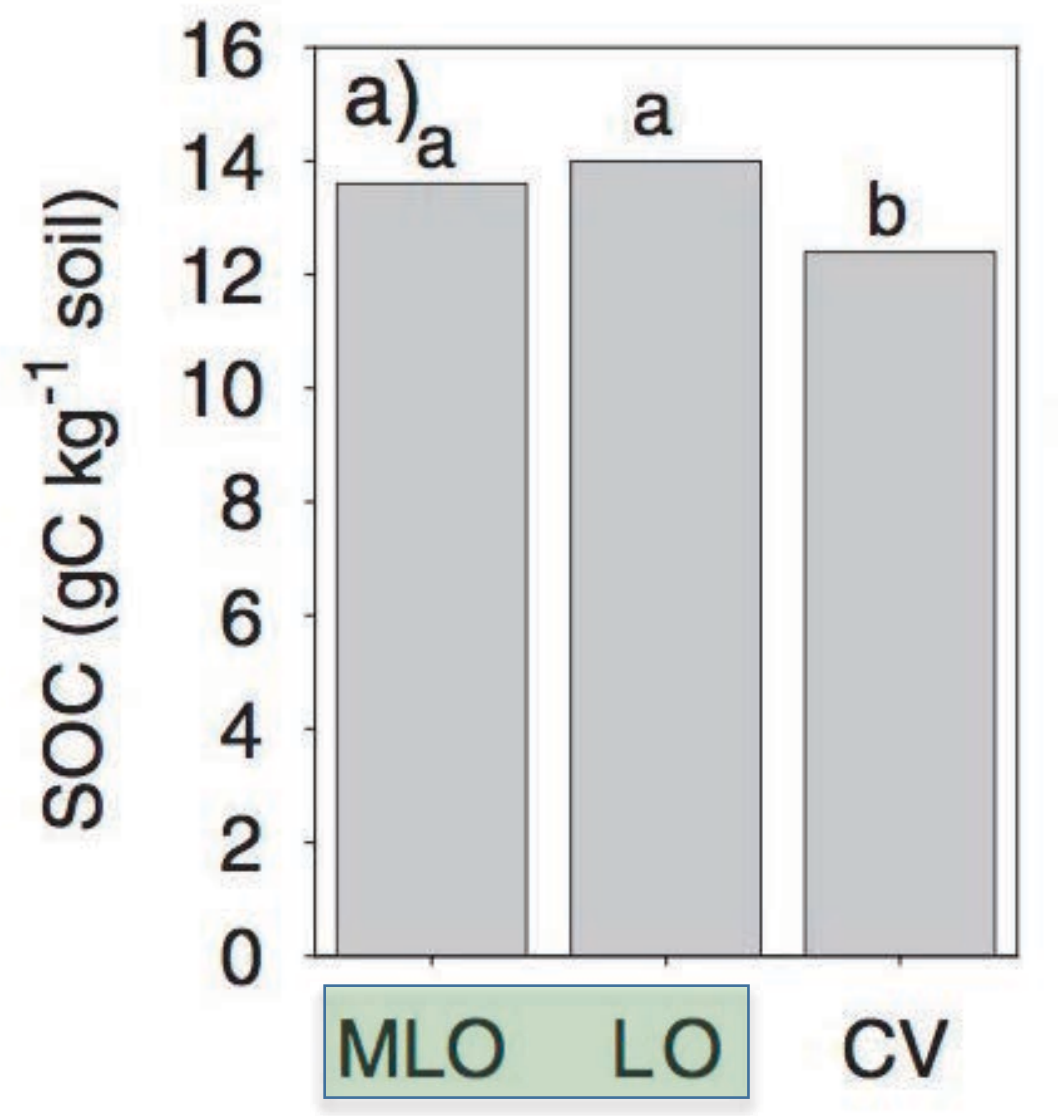
- Fallowing
- Crop rotation
- Manure and legume fertilizer

Organic Agriculture

Climate friendly practices

- Fallowing
- Crop rotation
- Manure and legume fertilizer
- Prohibition of most synthetic pesticides

Soil Organic Carbon
Organic vs Conventional

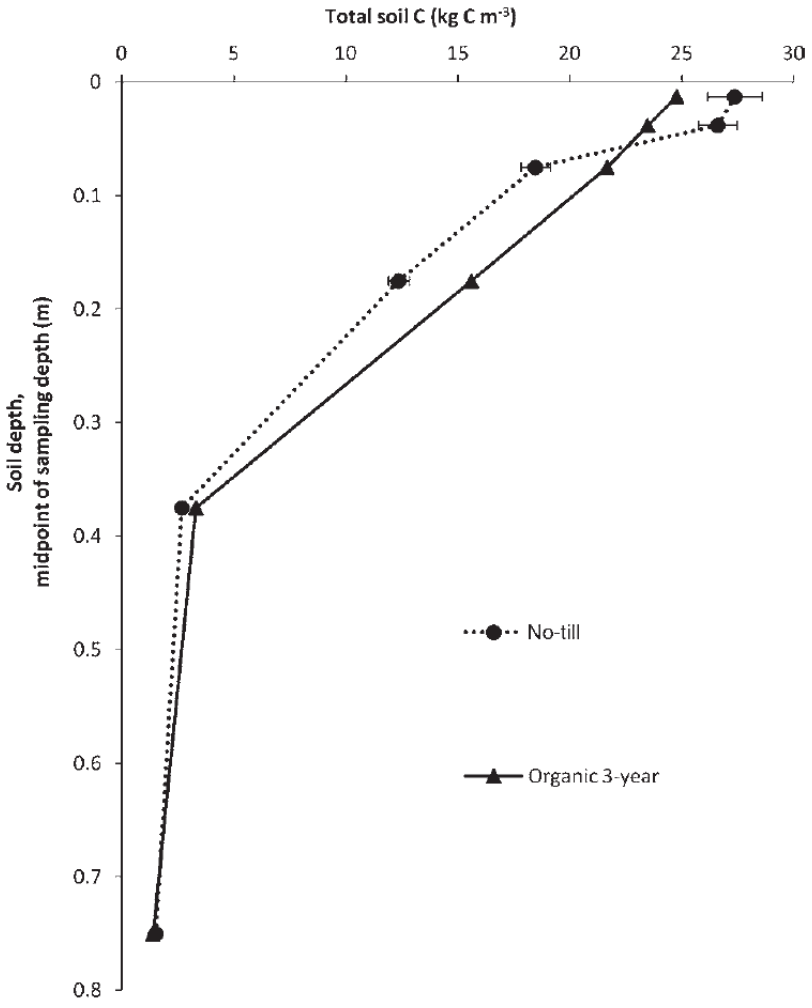


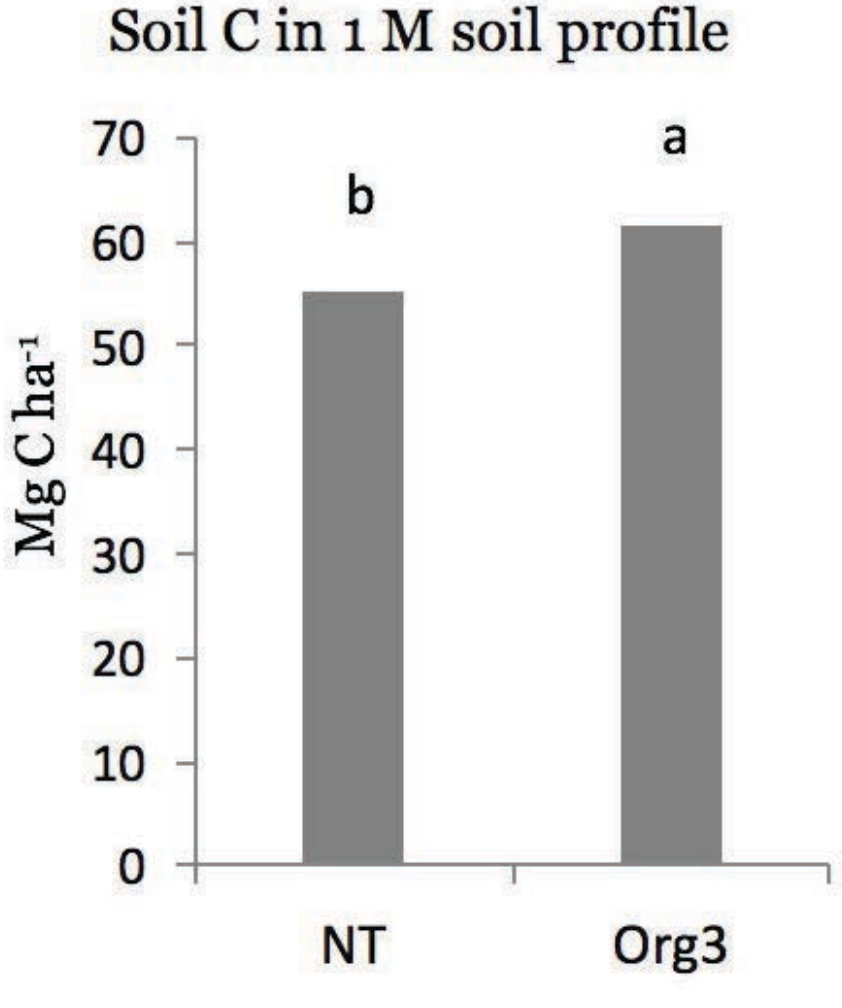
Soil Carbon

- Organic systems had on average 14% more total soil organic carbon

Marriott and Wander 2006

Soil Organic Carbon
Organic Till vs Conventional No-Till



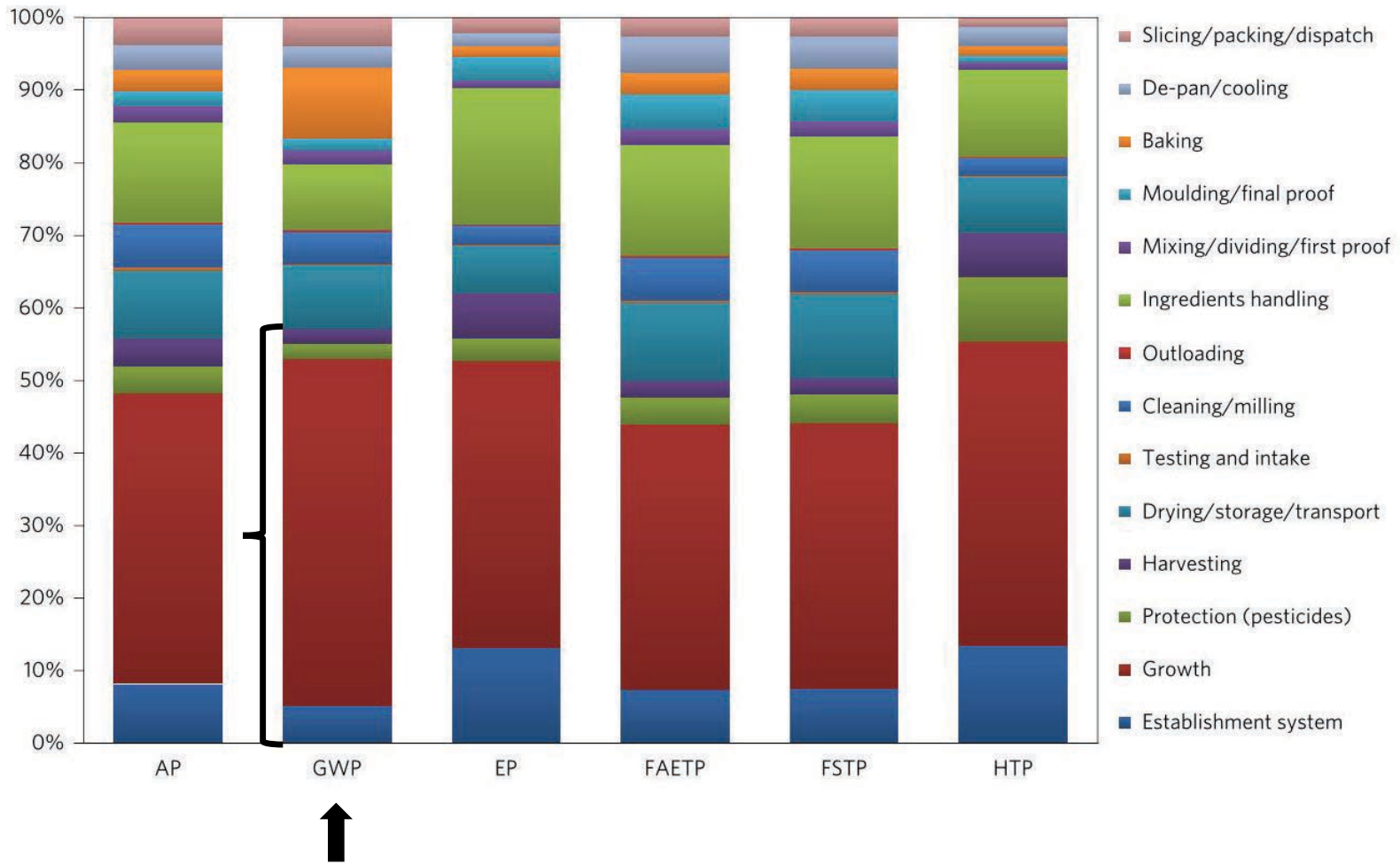


Conventional no- and low-till

- Organic tillage systems have greater amounts of SOC than conventional no-till

Cavigelli et al. 2013

Contributions to the Environmental Impact of a Loaf of Bread



Global warming potential

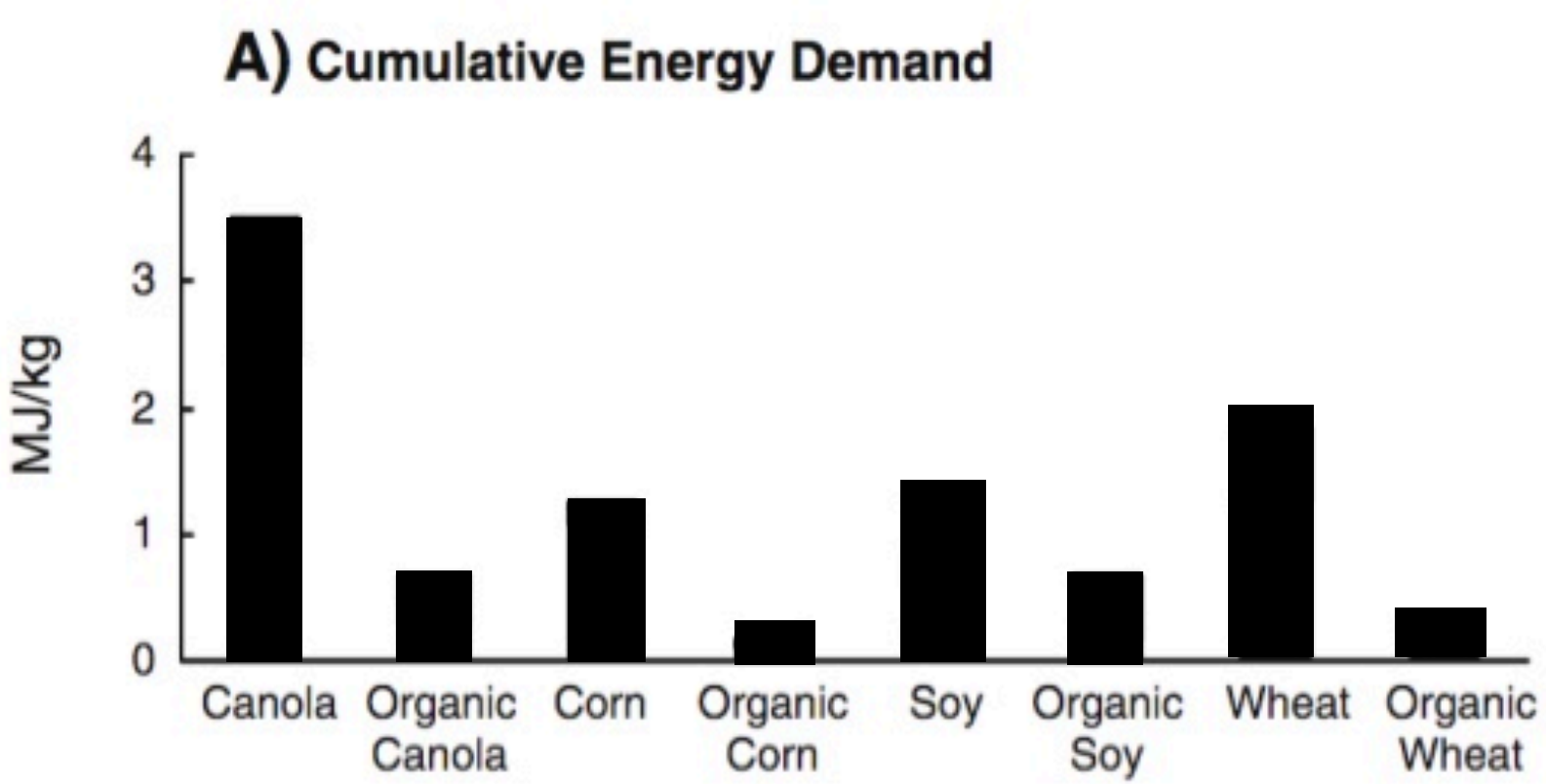
Environmental Impact

Loaf of Bread

- Ammonium nitrate fertilizer is responsible for 43% of the total environmental impact

Goucher et al. 2017

Modeled Cumulative Energy
Organic vs Conventional

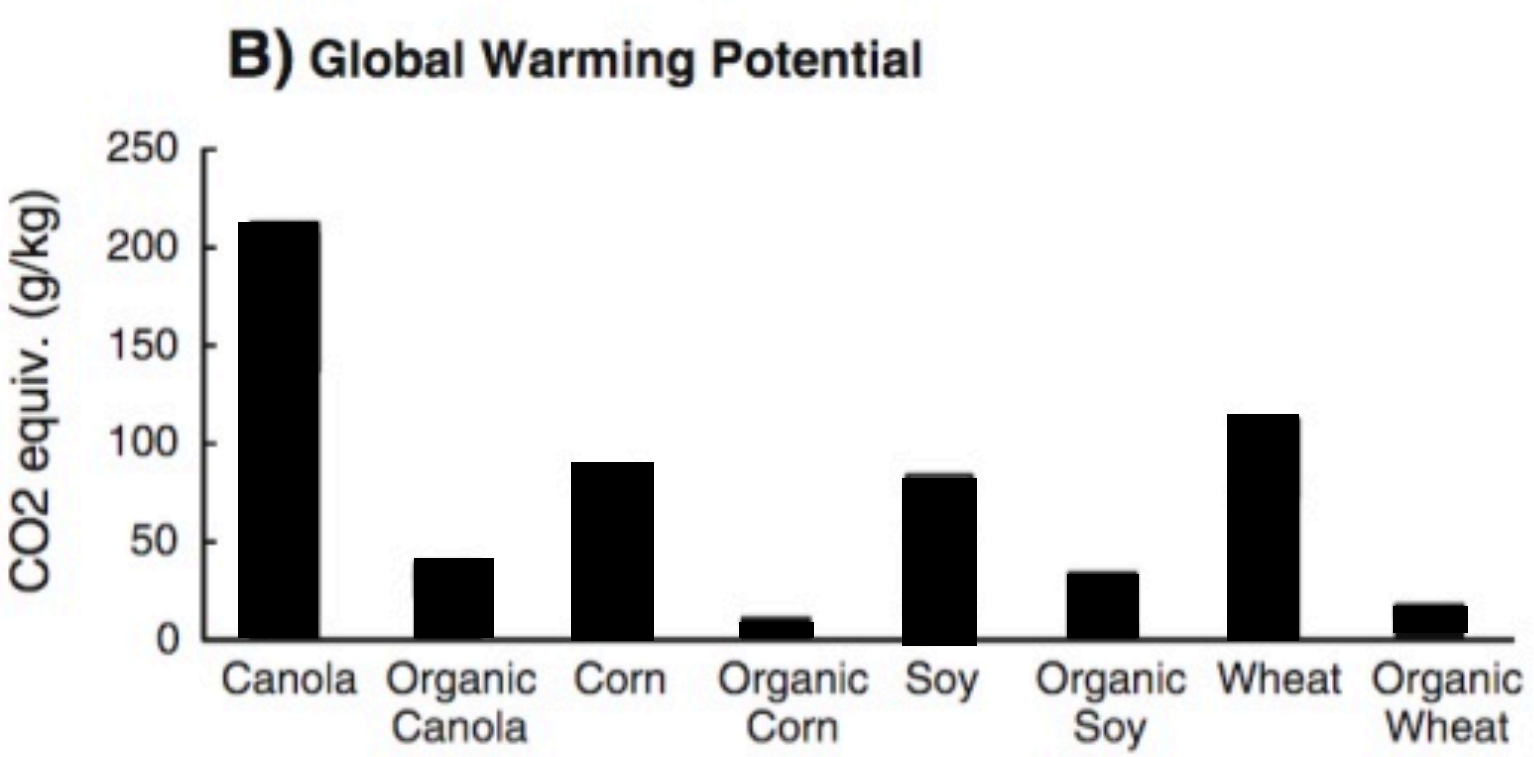


Energy Use

- On average organic crop production would consume 60% less energy

Pelletier et al. 2008

Global Warming Potential
Organic vs Conventional



Global Warming Potential

On average organic crop production would generate

- 25% fewer global warming emissions
- 80% fewer ozone depleting emissions

Pelletier et al. 2008

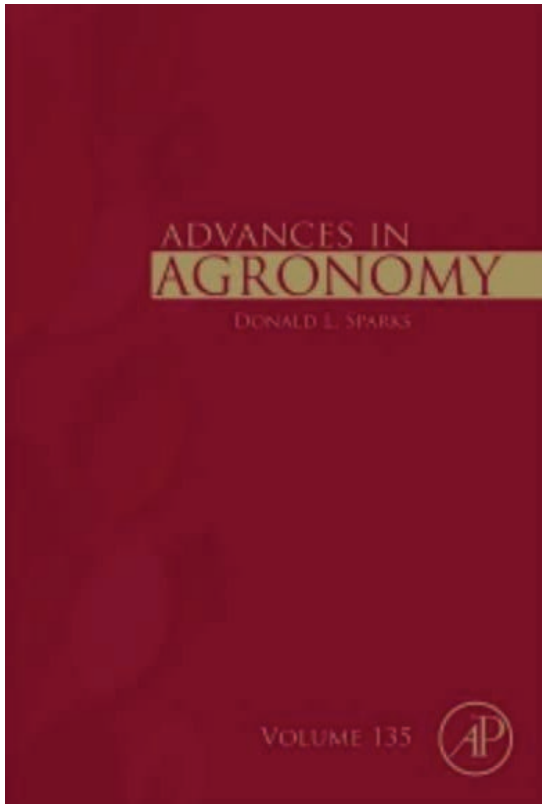
Organic Agriculture

- More soil organic carbon
- More energy efficient
- Reduced greenhouse gas emissions

National Comparison of the Total and Sequestered Organic Matter Contents of Conventional and Organic Farm Soils

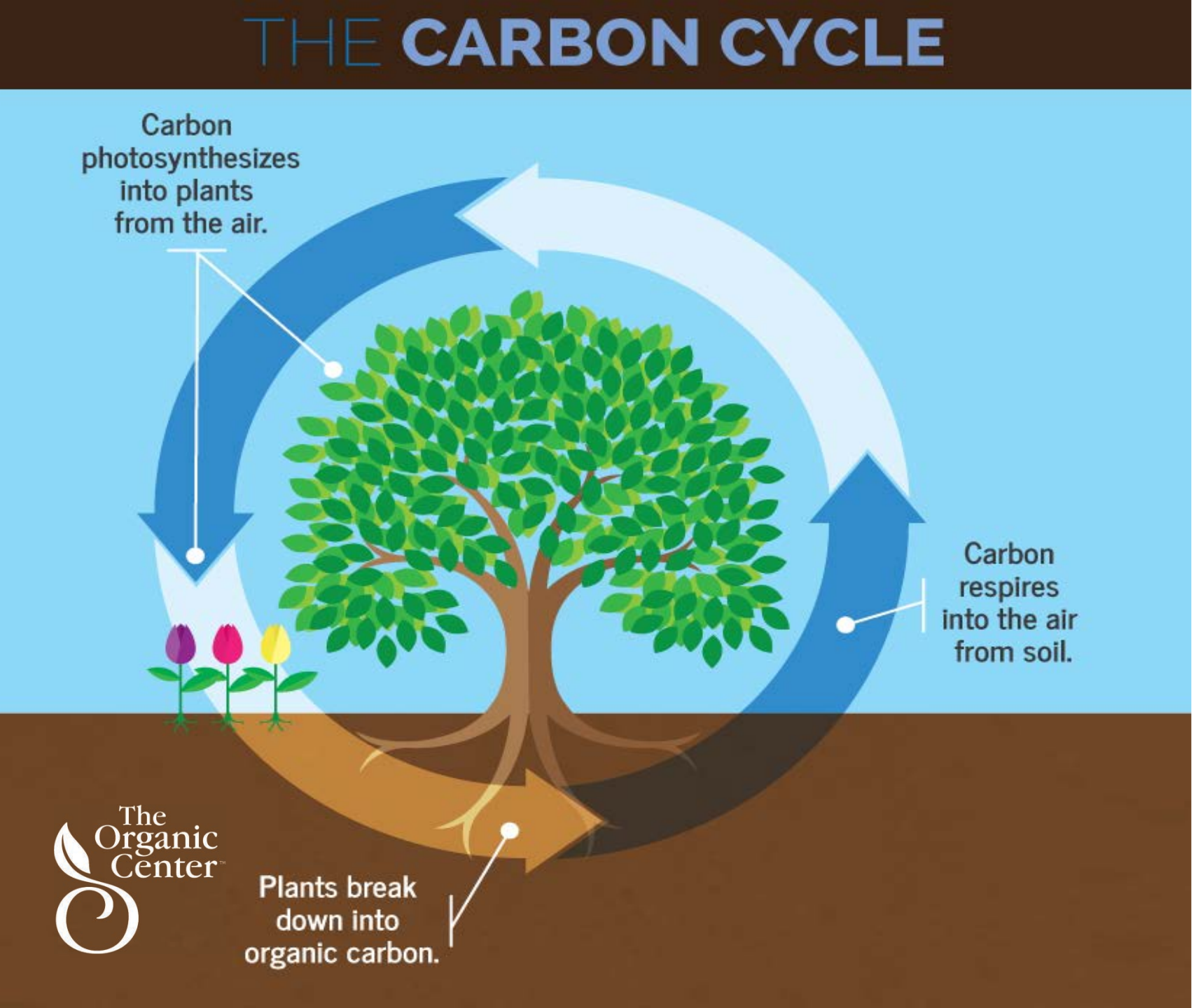
Elham A. Ghabbour, Geoffrey Davies, Tracy Misiewicz, Reem A. Alami, Erin M Askounis, Nicholas P. Cuozzo, Alexia J. Filice, Jennifer M. Haskell, Andy K. Moy, Alexandra C. Roach and Jessica Shade

Advances in Agronomy
Volume 146
Release date: October 1, 2017



New Research

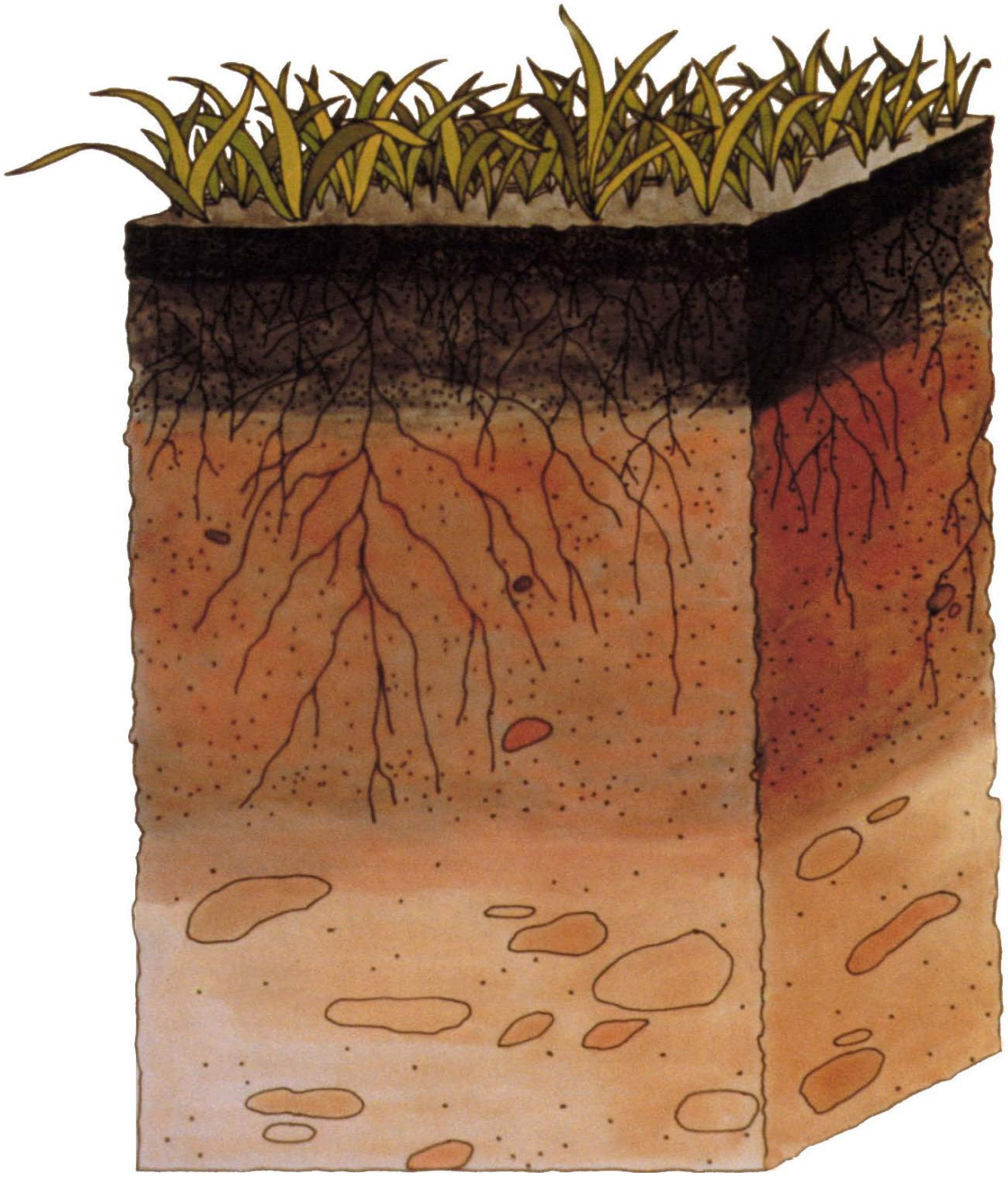
- Northeastern University National Soil Project
- Drs. Geoff Davies and Elham Ghabbour
- Comparison of long-term carbon storage in conventional and organically managed soils



Soil Organic Carbon

Why is it so important?

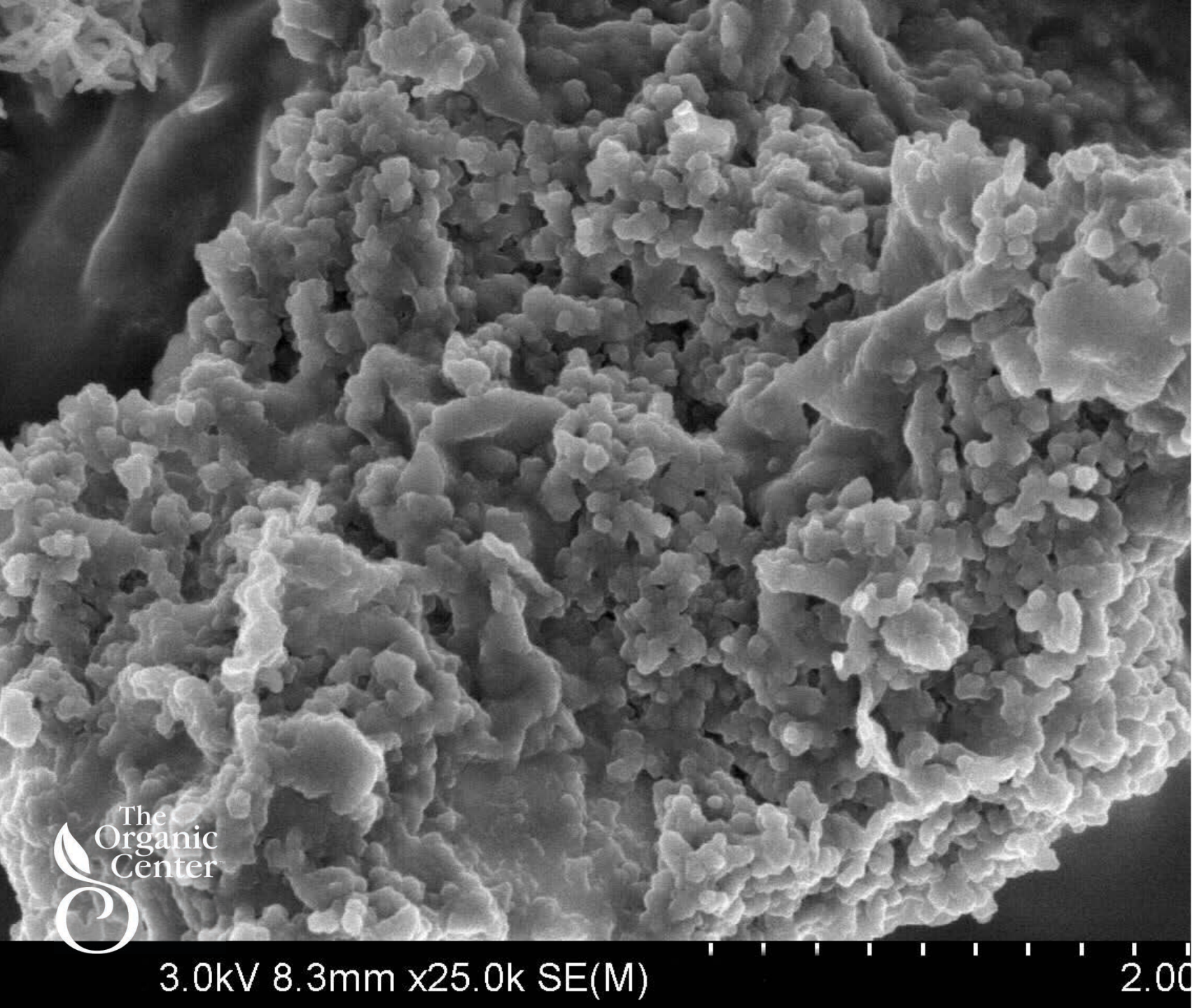
- Reduces erosion
- Protects against compaction
- Improves aeration, water filtration and water holding capacity
- Reserve for essential nutrients
- Supports soil organisms by providing a food source



Soil Organic Carbon

What are its components?

- Two main pools of soil organic carbon
- Labile carbon pool (high turnover)
- Stable carbon pool also known as humic substances (low turnover)
    - Humic acid
    - Fulvic acid



Humic Substances

What are they and why are they important?

- Major organic constituents of soil
- Contain carbon
- Long-lived and stable
- Linked with higher fertility, beneficial soil structure, etc.

Questions

Do organic soils have higher levels of humic substances?

- Quantify the amount of humic substances in soils from organic and conventional farms
- Test the hypothesis that organic soils are better at long-term carbon sequestration

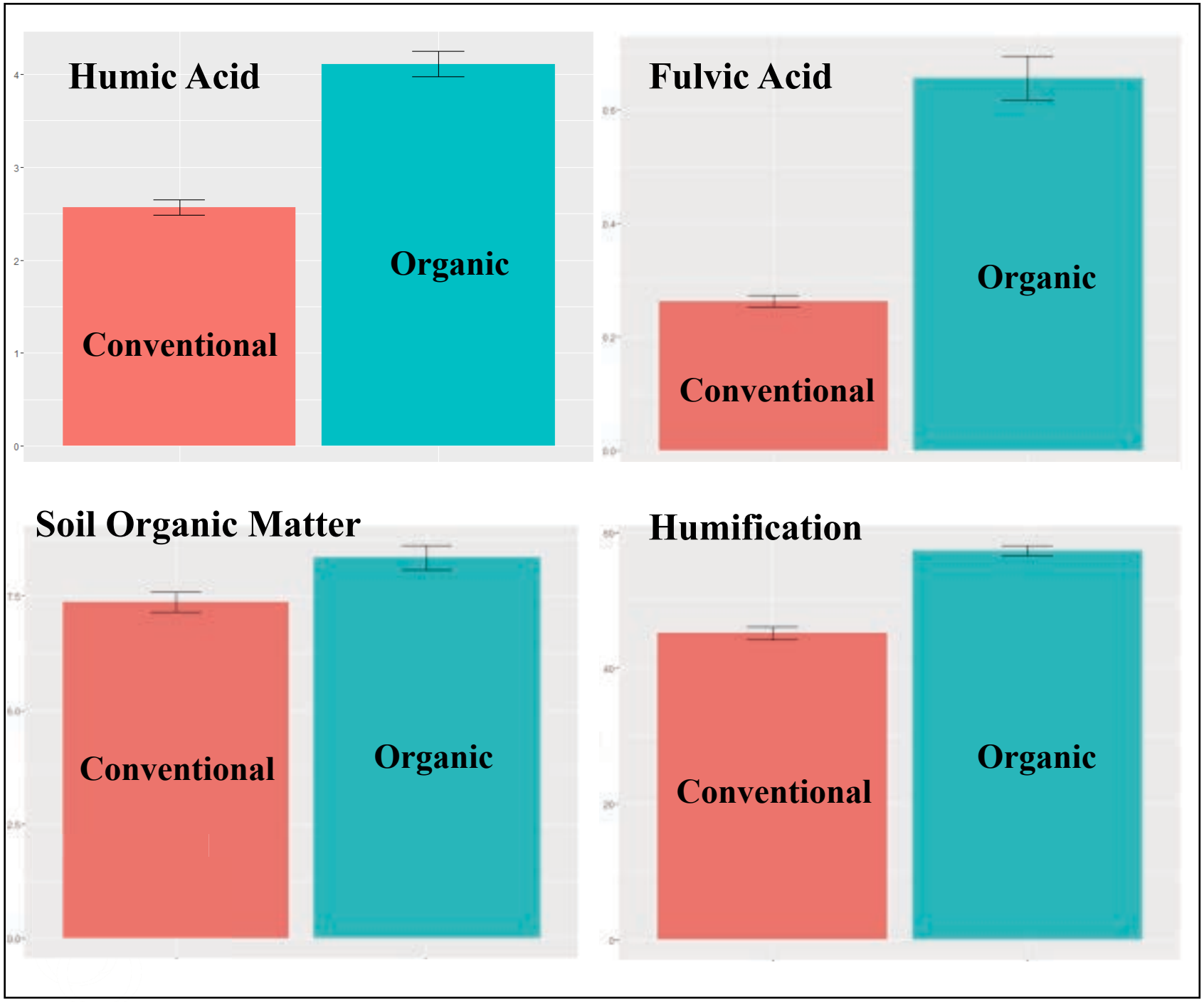
Previous Research

- Studies typically do not differentiate between different carbon pools.
- Yield results that may vary over time and do not necessarily represent sequestration

The Organic Center

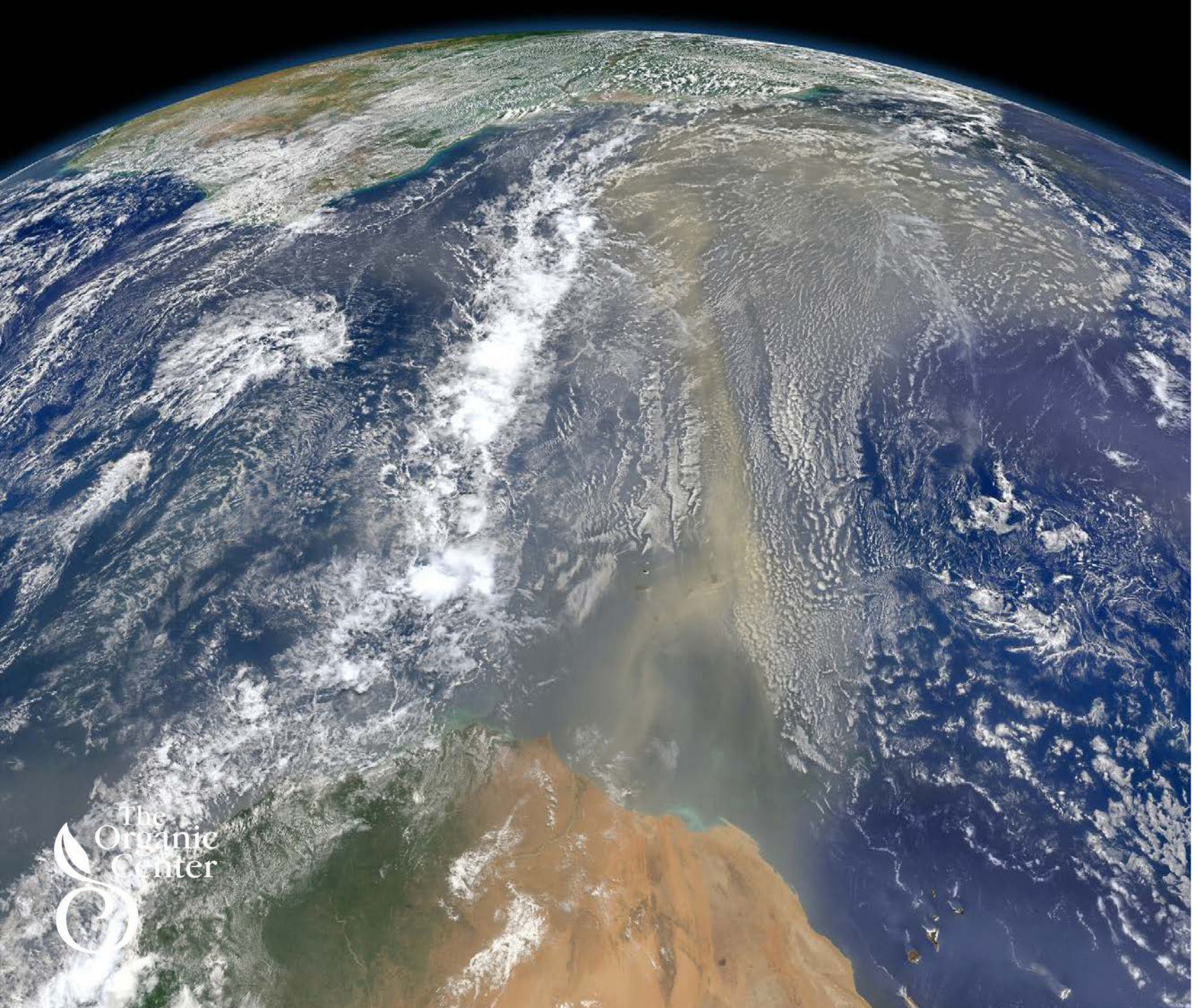
Approach

- The Organic Center
- The National Soil Project at Northeastern University
- Over 1,000 farmers
- 659 organic samples
- 728 conventional samples



Results

- On average, soils from organic farms had higher levels of:
  - 13% higher soil organic matter
  - 1 ½ times higher fulvic acid levels
  - 44% more humic acid
  - 26% more humification (i.e. long term carbon storage)



Importance

- First large-scale study comparing stable components of organic matter from organic and conventional farms
- Takes a broad view, and incorporates variation across management styles
- Shows that organic farming can build soil health and can contribute to climate change mitigation

Future Work

- What practices are must important for building sequestered carbon in soils?
- How do we translate quantification of increased soil carbon sequestration into emissions offset?
- How can organic systems further reduce greenhouse gas emissions? (methane and nitrous oxide)
- Quantification of economic benefits for farmers
- Translation of research results into tools for farmers and industry

Highlights

- Organic agriculture as a whole can positively impact climate change mitigation through carbon sequestration
- On average organic agriculture is more energy efficient than conventional agriculture – largely through omission of fossil fuel based fertilizers
- Organic systems still need improvement!

Tracy Misiewicz
Associate Director of Science Programs
www.organic-center.org
tmisiewicz@organic-center.org

Citations

Ellis, E.C., Klein Goldewijk, K., Siebert, S., Lightman, D. and Ramankutty, N., 2010. Anthropogenic transformation of the biomes, 1700 to 2000. Global ecology and biogeography, 19, 589-606.

Sanderman, J., Hengl, T. and Fiske, G.J., 2017. Soil carbon debt of 12,000 years of human land use. Proceedings of the National Academy of Sciences, 114(,9575-9580.

Marriott, E. E., and M. M. Wander. 2006. Total and Labile Soil Organic Matter in Organic and Conventional Farming Systems. Soil Sci. Soc. Am. J. 70, 950-959.

Cavigelli, M.A., S.B. Mirsky, J.R. Teasdale, J.T. Spargo, and J. Doran 2013. Organic grain cropping systems to enhance ecosystem services. Renewable agriculture and food systems, 28, 145-159.

Goucher, L., Bruce, R., Cameron, D.D., Lenny, K.S. and Horton, P., 2017. The environmental impact of fertilizer embodied in a wheat-to-bread supply chain. *Nature plants*, *3*, p.17012.

Pelletier, N., Arsenault, N. & Tyedmers, P. 2008. Environmental Management 42, 989.

Ghabbour, E.A., Davies, G., Misiewicz, T., Alami, R.A., Askounis, E.M., Cuozzo, N.P., Filice, A.J., Haskell, J.M., Moy, A.K., Roach, A.C. and Shade, J., 2017. National Comparison of the Total and Sequestered Organic Matter Contents of Conventional and Organic Farm Soils. *Advances in Agronomy*.

Please take our <1 minute Post Webinar Survey!

facebook.com/climatecollaborative

@ClimateColl
#climatecollaborative

www.climatecollaborative.com

a project of

OSC² ONE STEP CLOSER Organic Sustainable Community

Sustainable Food Trade Association
organic leaders for sustainability