RODALE INSTITUTE™

Conservation Agriculture Soil Health Matters

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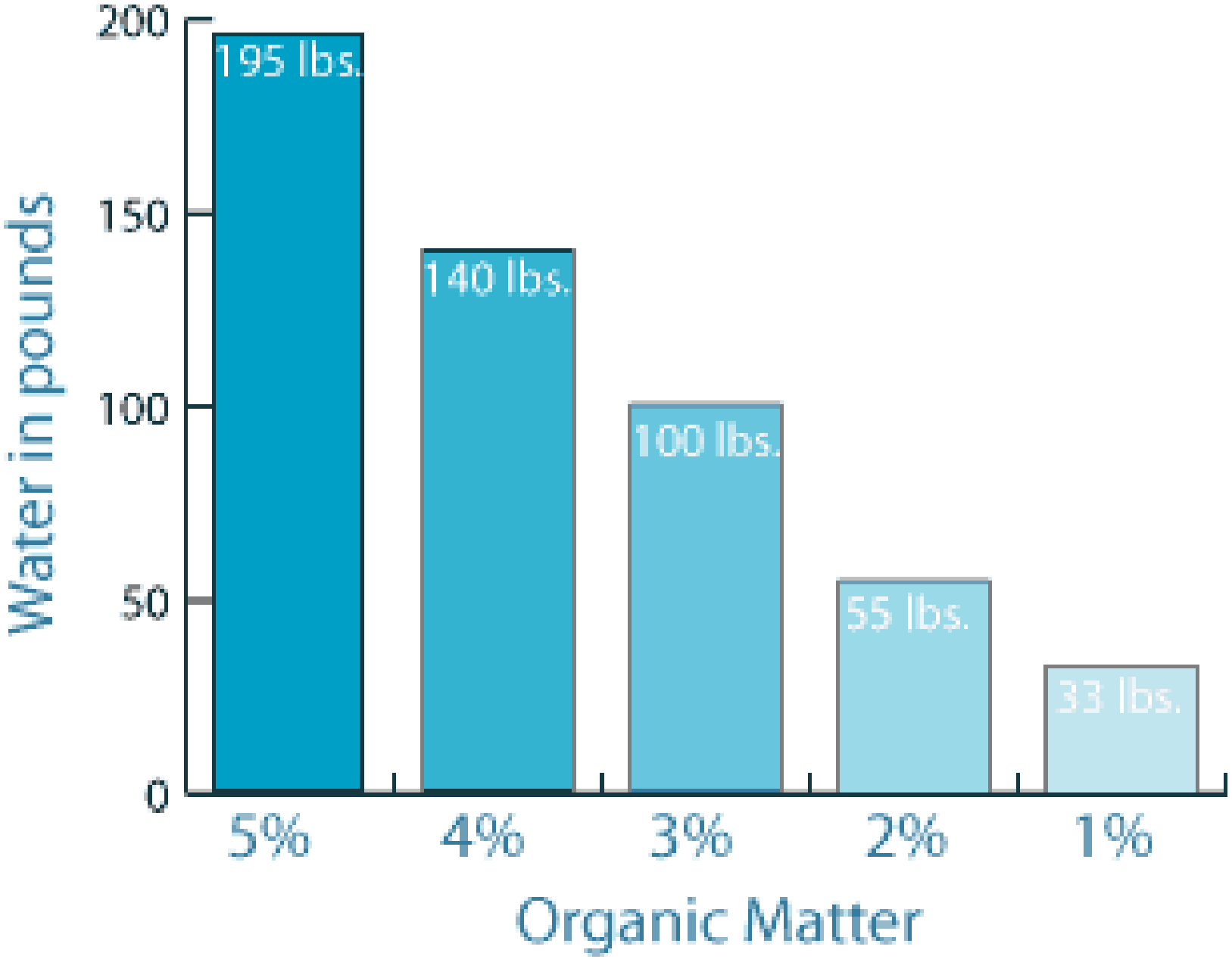
Rodale Institute 1970

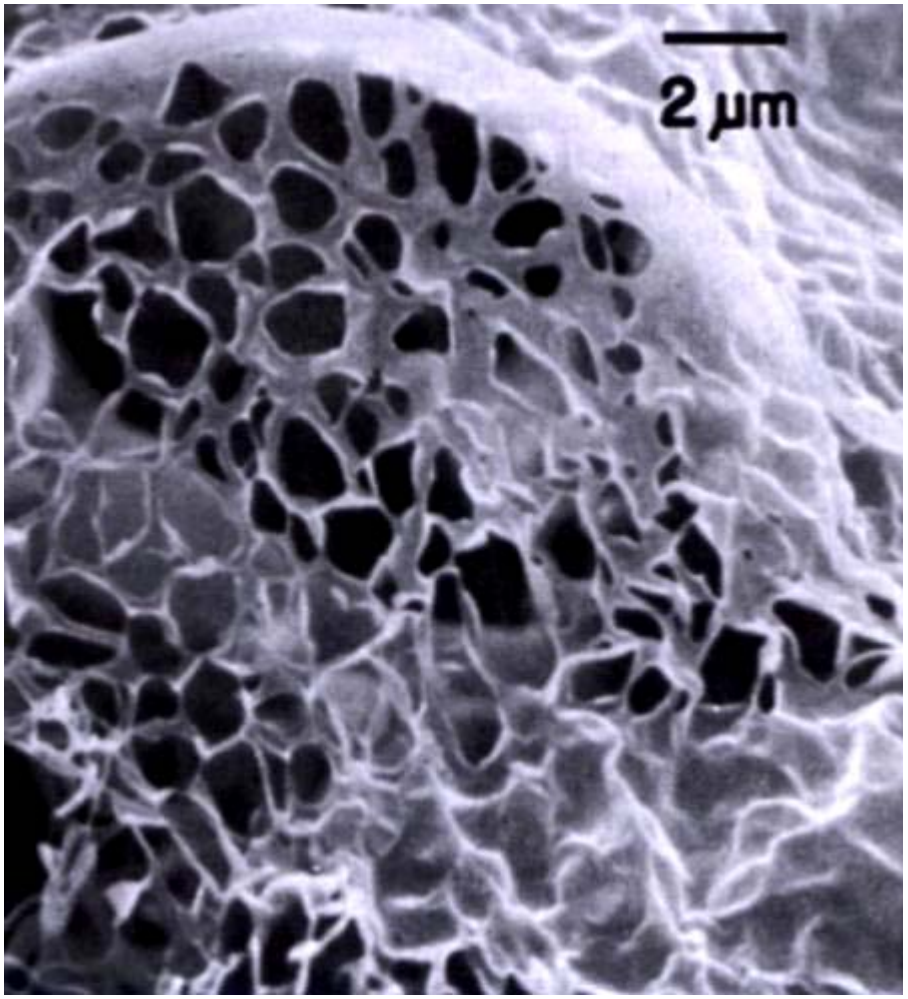
Stop Erosion

Water Holding Capacity



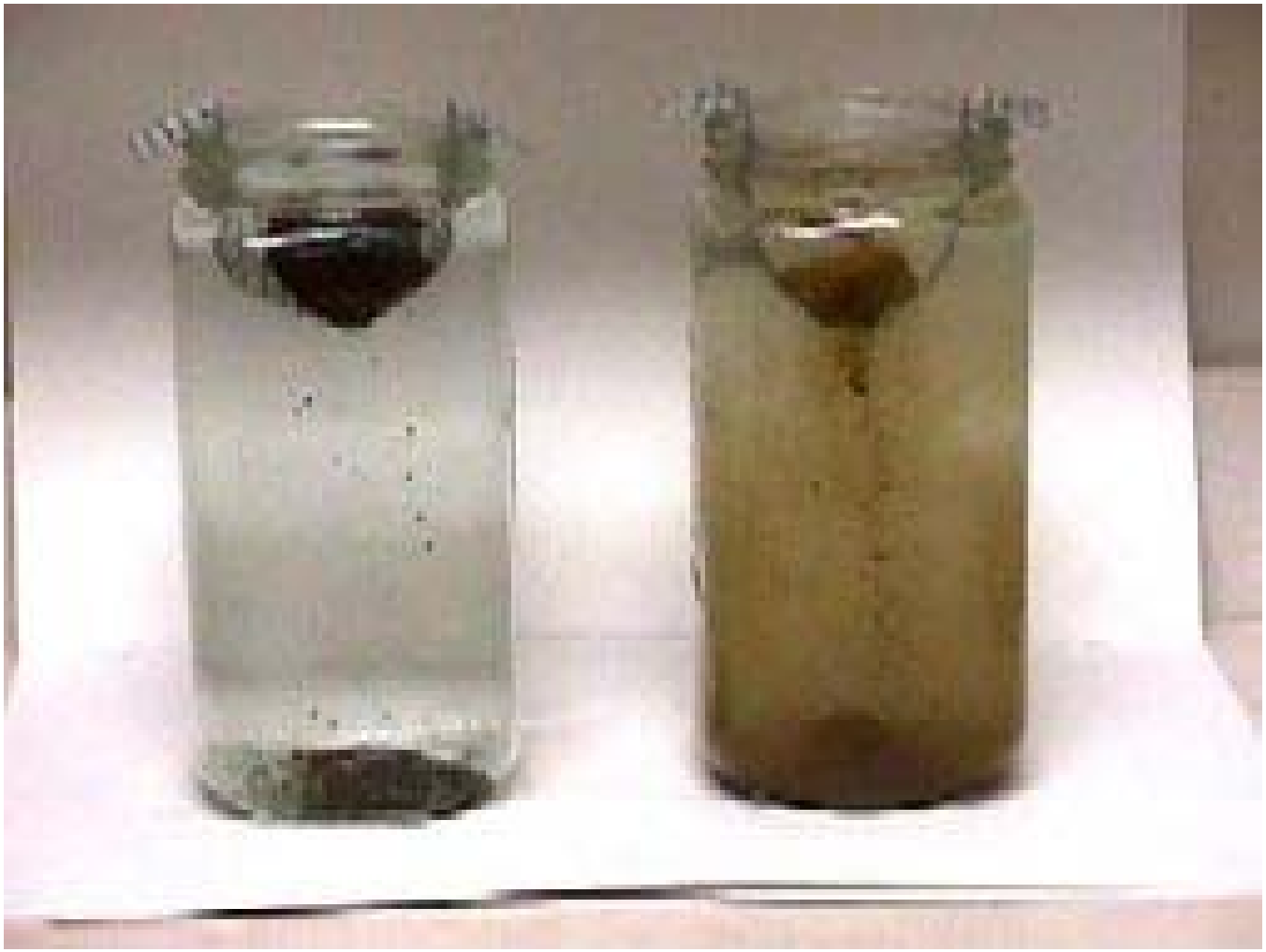
Soil Organic Matters

- **Holds water**
- **Cements soil particles**
- **Reduces acid soil toxicity through natural liming**
- **Increases micronutrient availability**



Electron micrograph of soil humus

Reducing Erosion



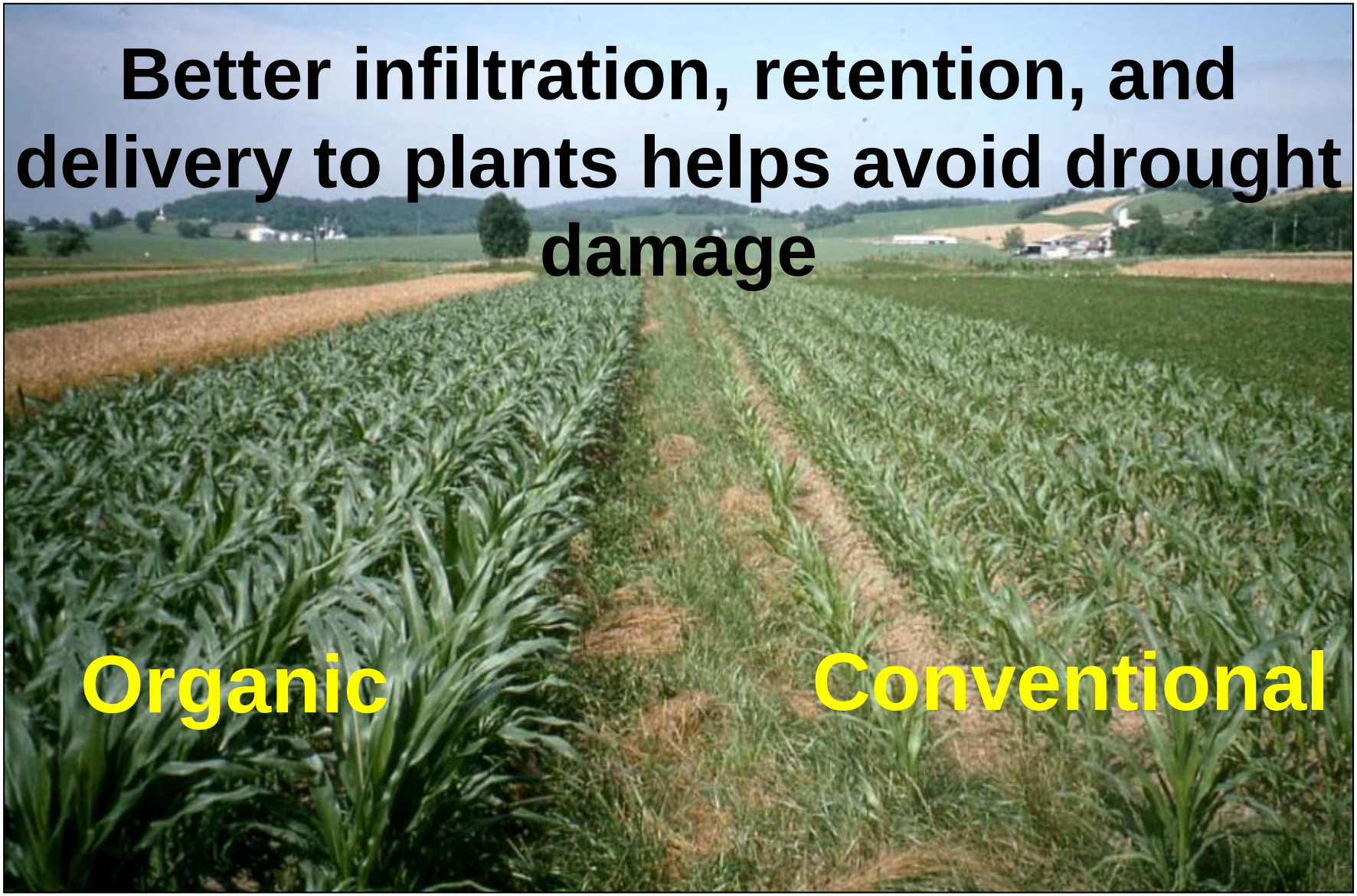

NATIONAL GEOGRAPHIC
MAGAZINE

Organic Matter Increases Infiltration

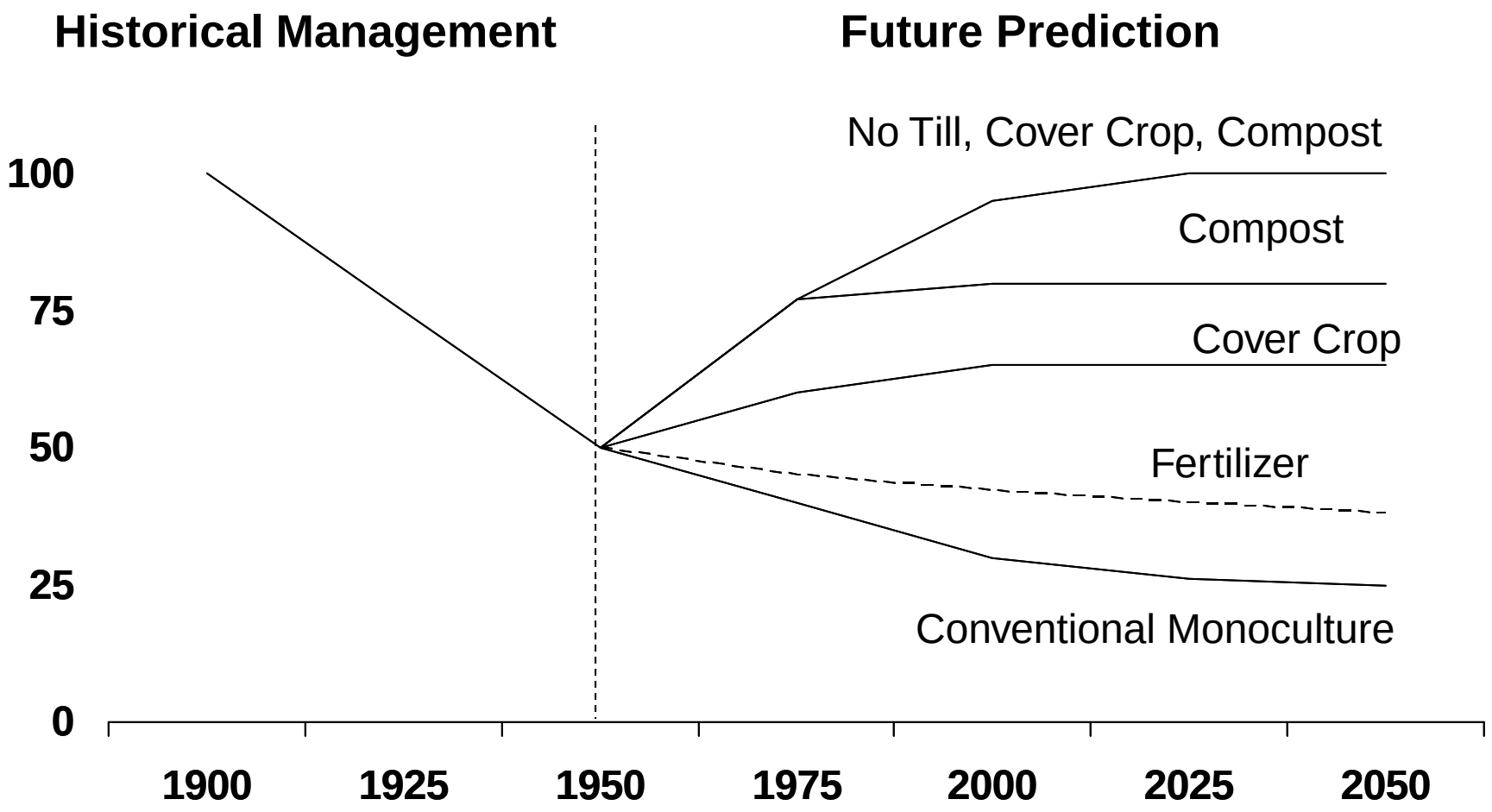
Organic Using Compost

Conventional

Organic Corn - 1995 Drought

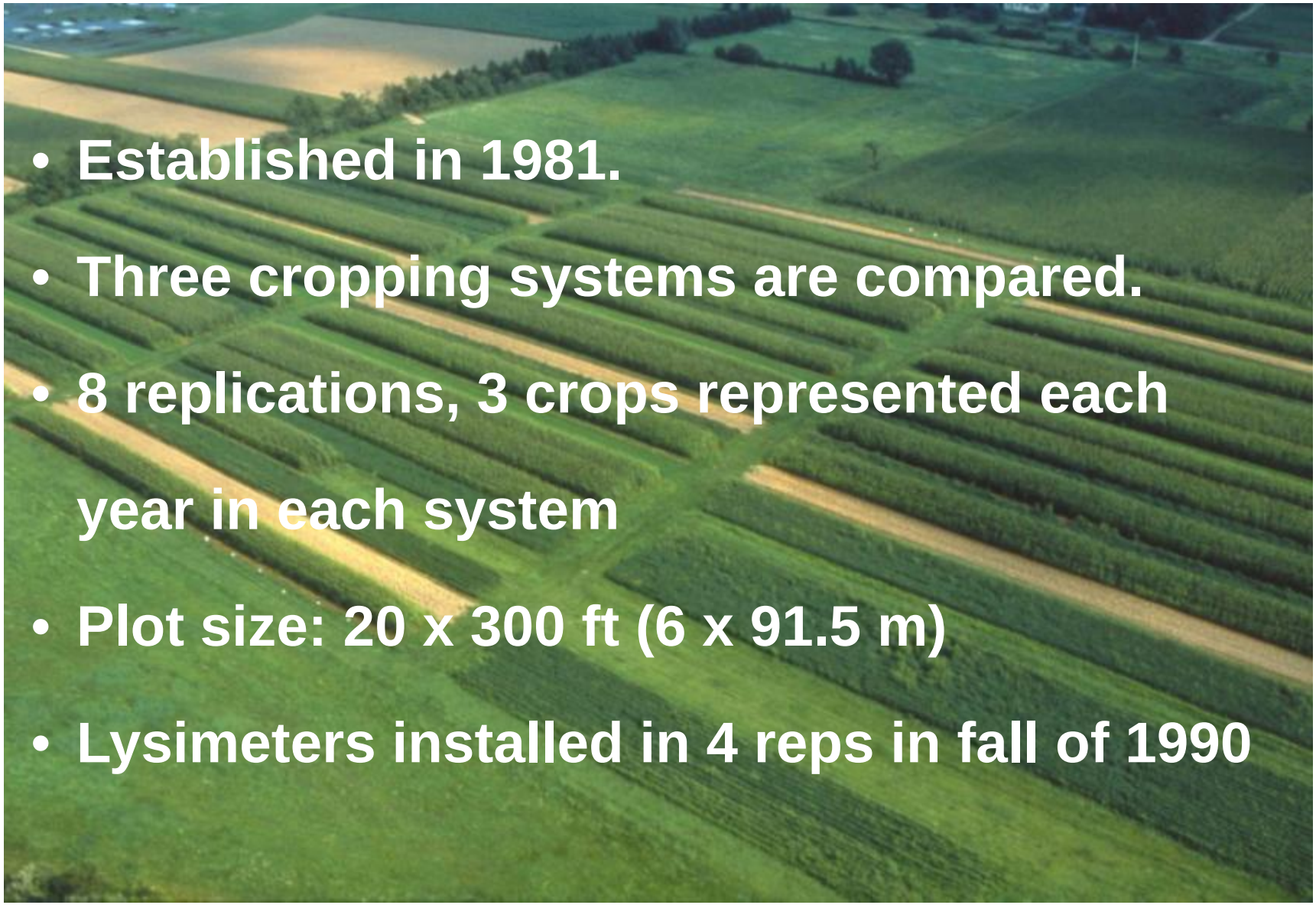


Soil Organic Matter (mt / ha)



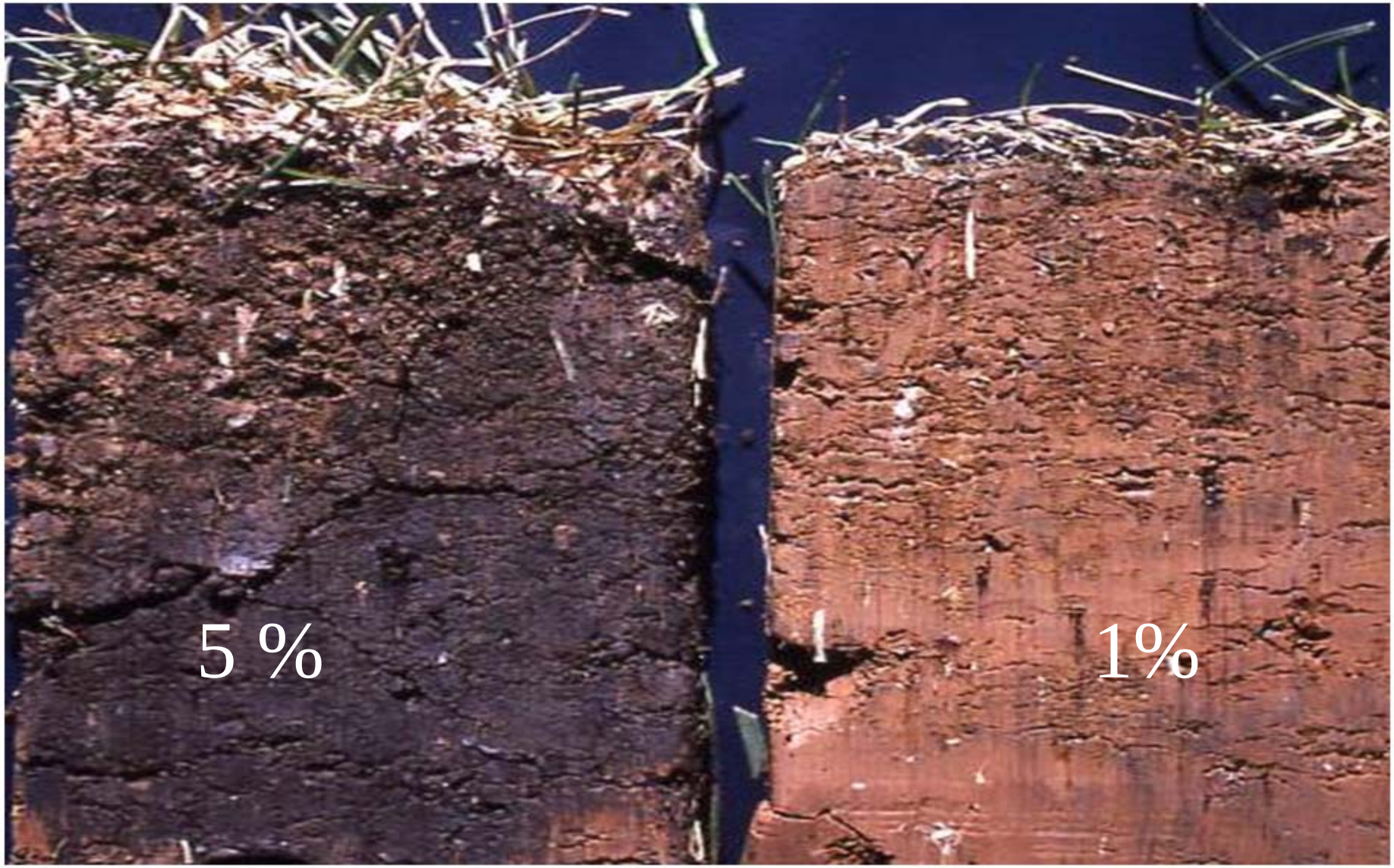
The Farming System Trial ®

The Farming System Trial ®

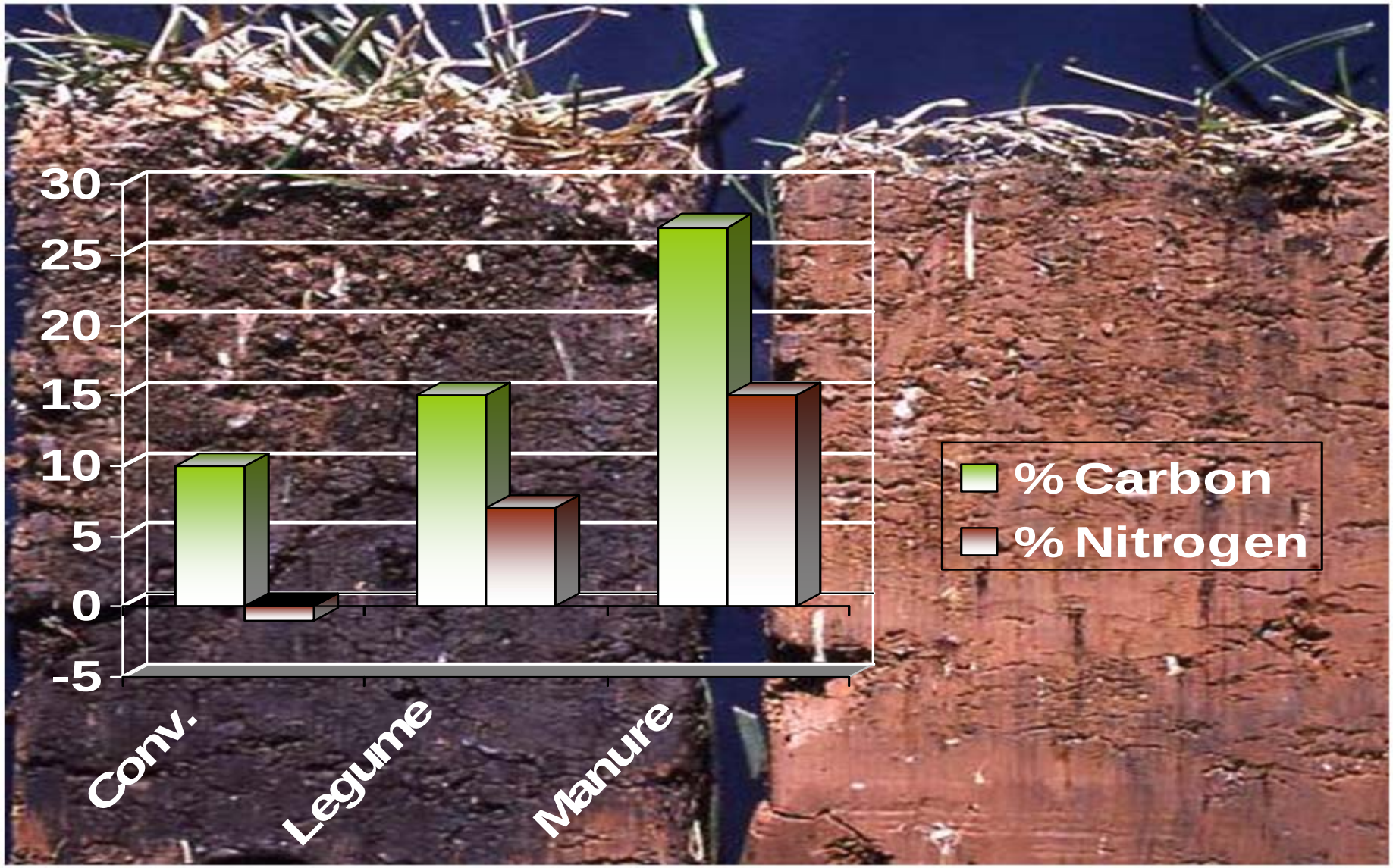


- Established in 1981.
- Three cropping systems are compared.
- 8 replications, 3 crops represented each year in each system
- Plot size: 20 x 300 ft (6 x 91.5 m)
- Lysimeters installed in 4 reps in fall of 1990

Soil Organic Matters



FST Soil Carbon and Soil Nitrogen change from 1981 to 2002

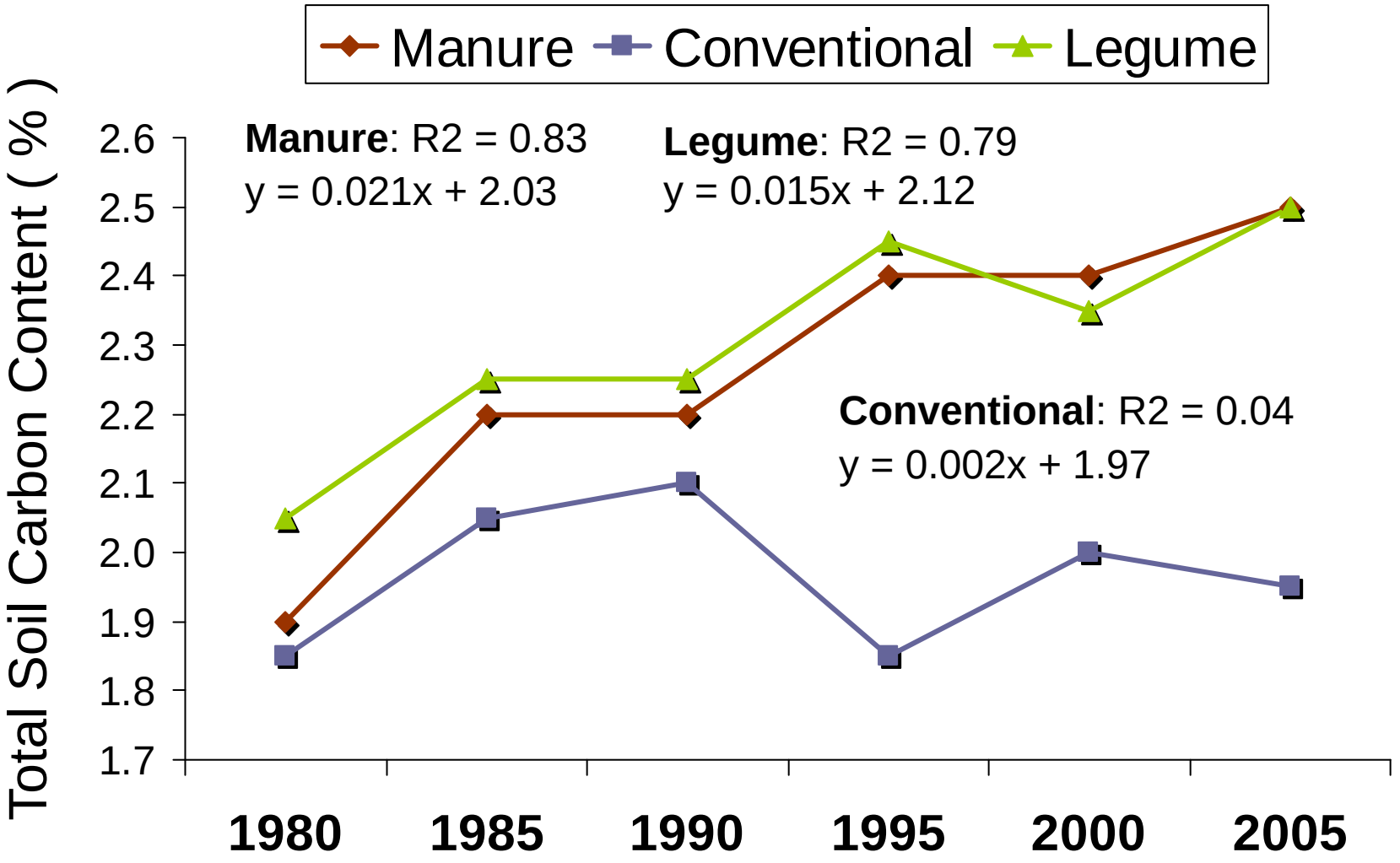


Soil in Organic Systems

- Higher corn and soybean yields in drought years
- Increased soil C and N

- Higher water infiltration
- Higher water holding cap.
- Higher microbial activity

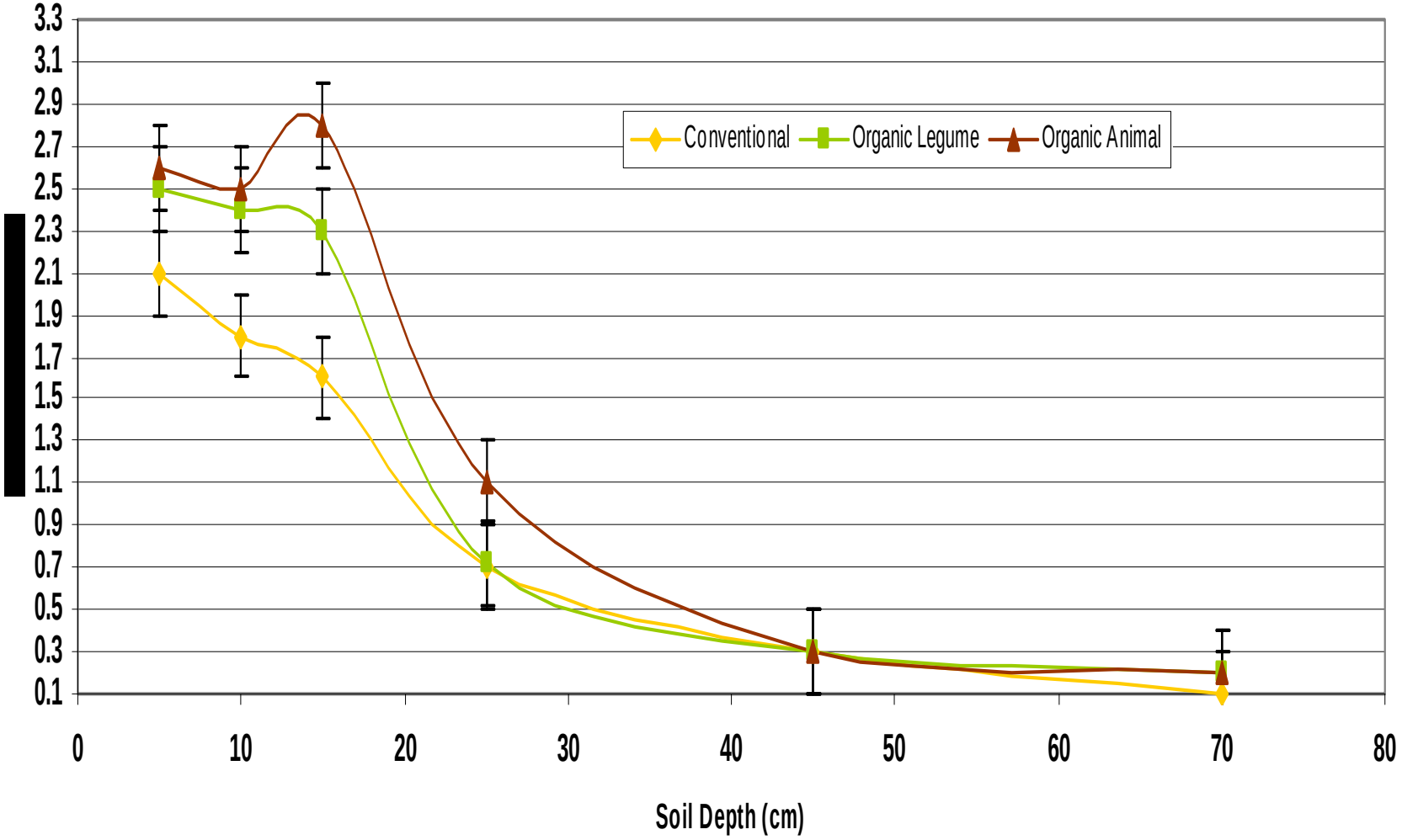
Carbon is Covered



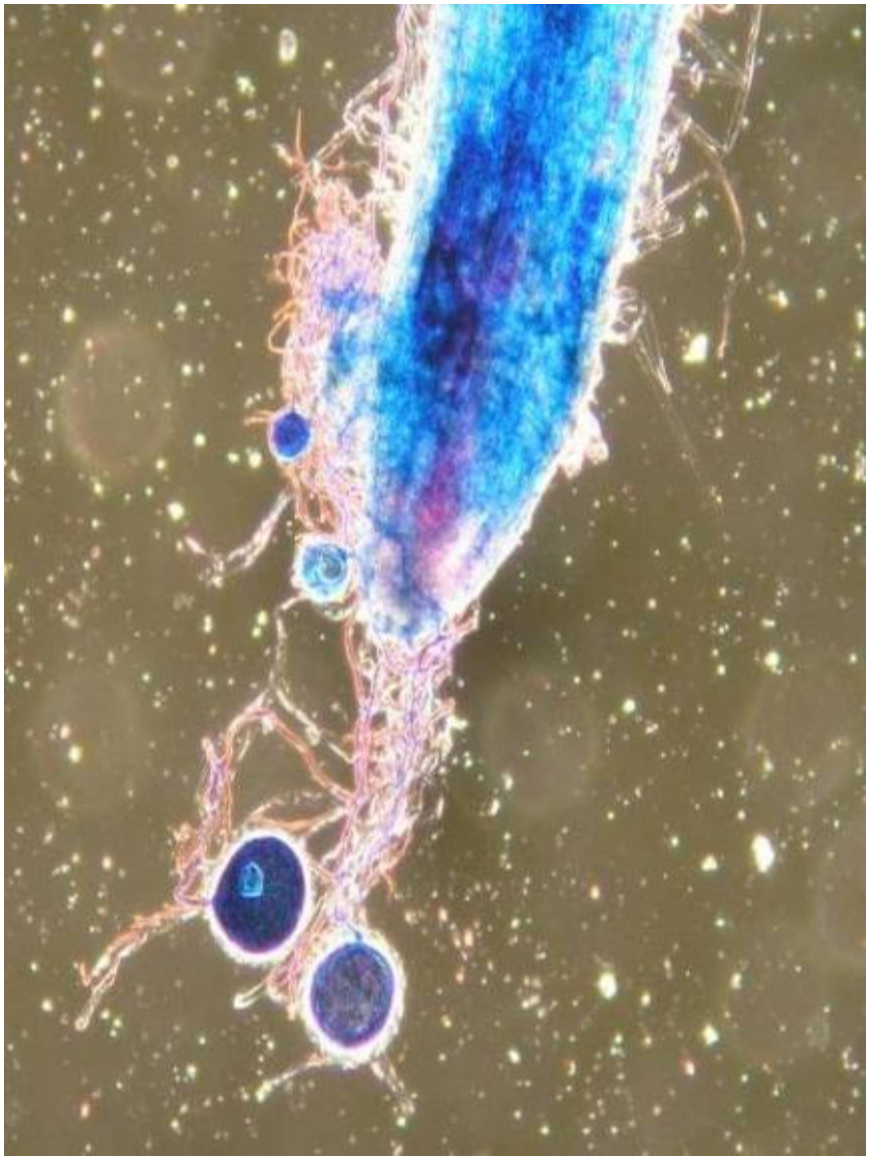
Carbon Profile

Depth in Organic & Convention Systems

Farming Systems Trial 2006

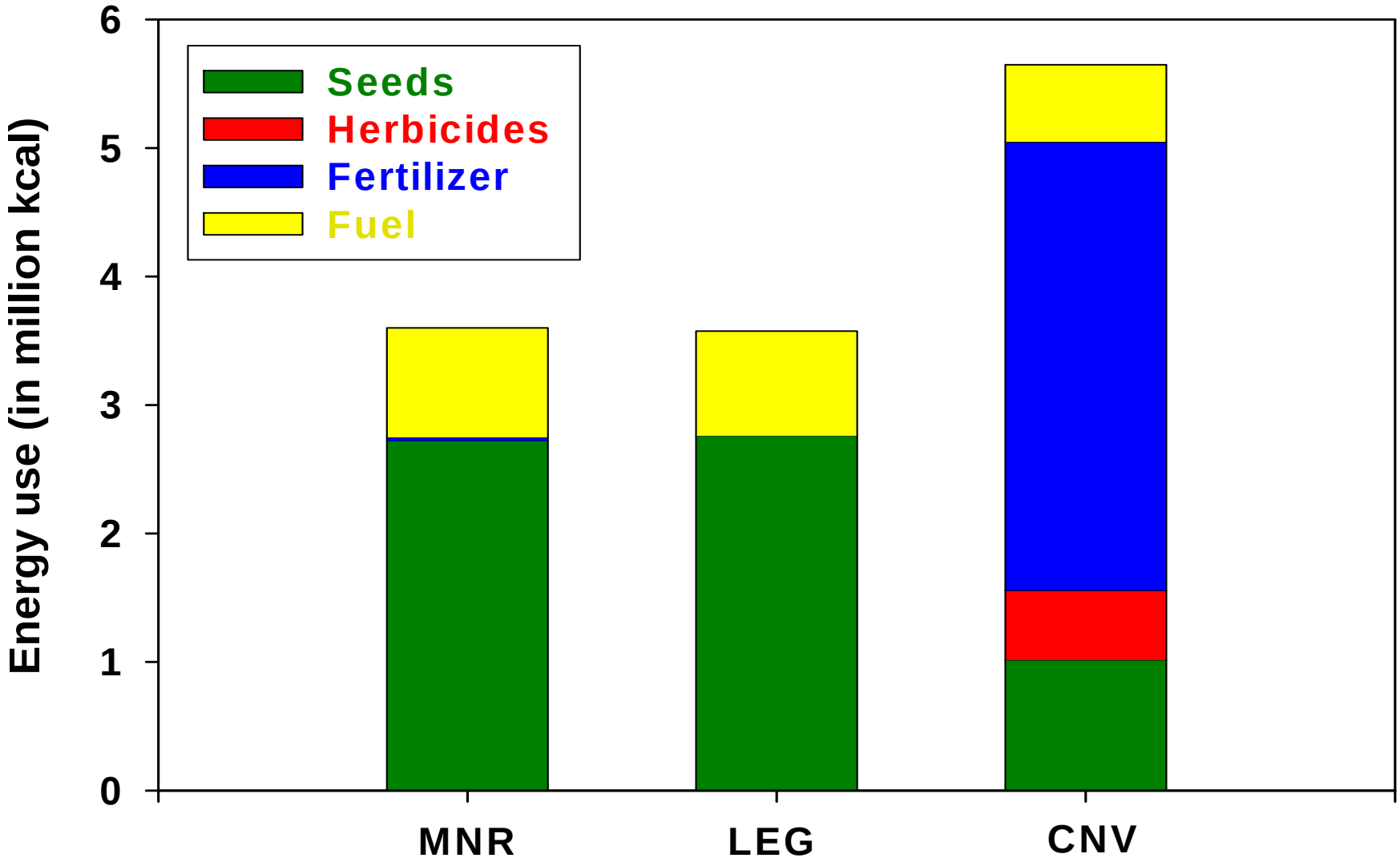


Mycorrhizal Fungi



- Extends plant root systems
- Produces erosion-resistant, carbon enriched soil
- Provides mechanisms for soil biological carbon fixation
- Slows decay of organic matter

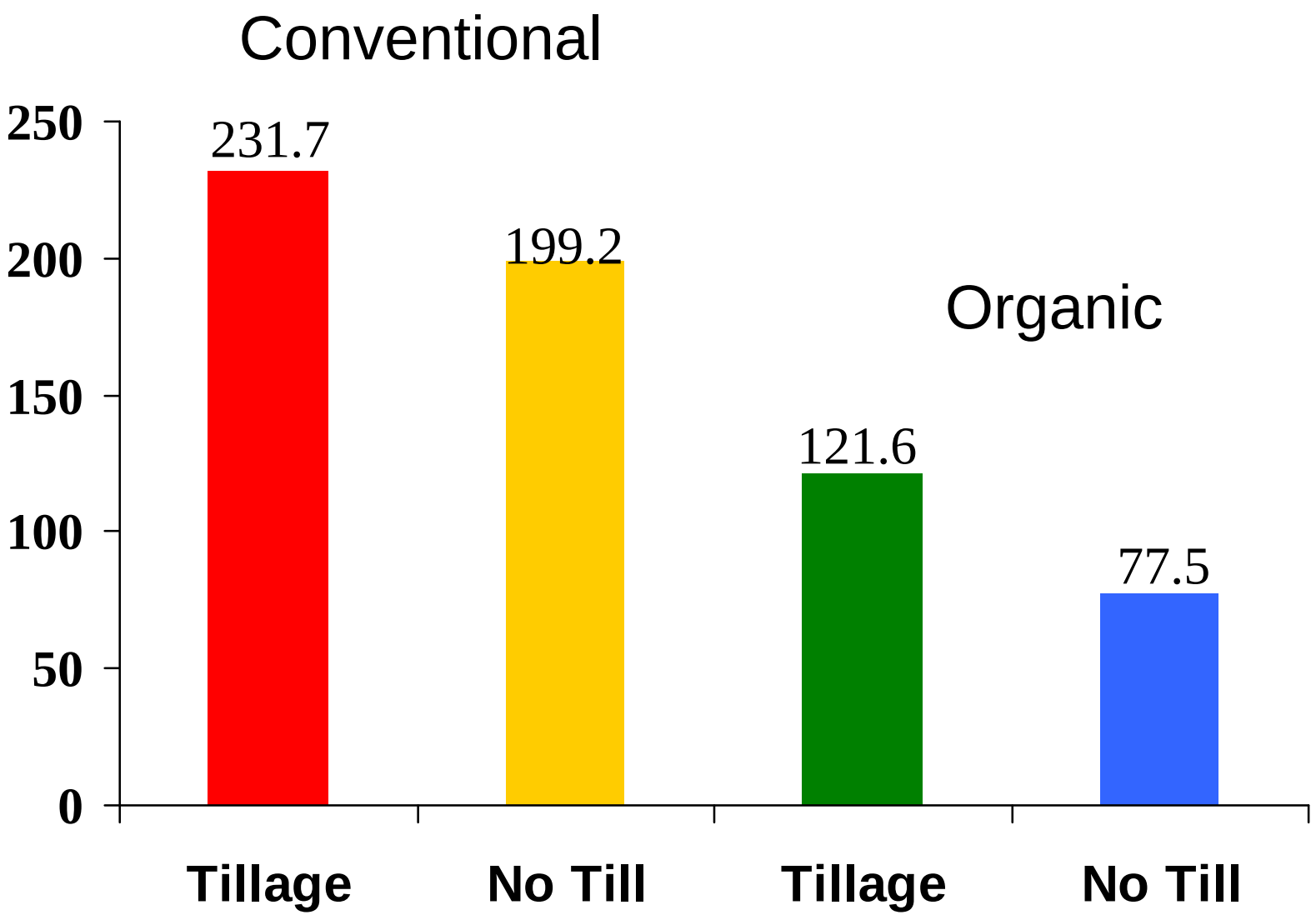
Energy Use FST™



No-Till Roller Crimper

Biologically Based No-Till

Energy Used in Different Corn Production Systems



Successful Weed Control

Biologically Based

No-Till Corn

Proven, Affordable, Immediate

Holistic

Grazing

Biologically Based

No Till

River Restoration

Basic grazing determine

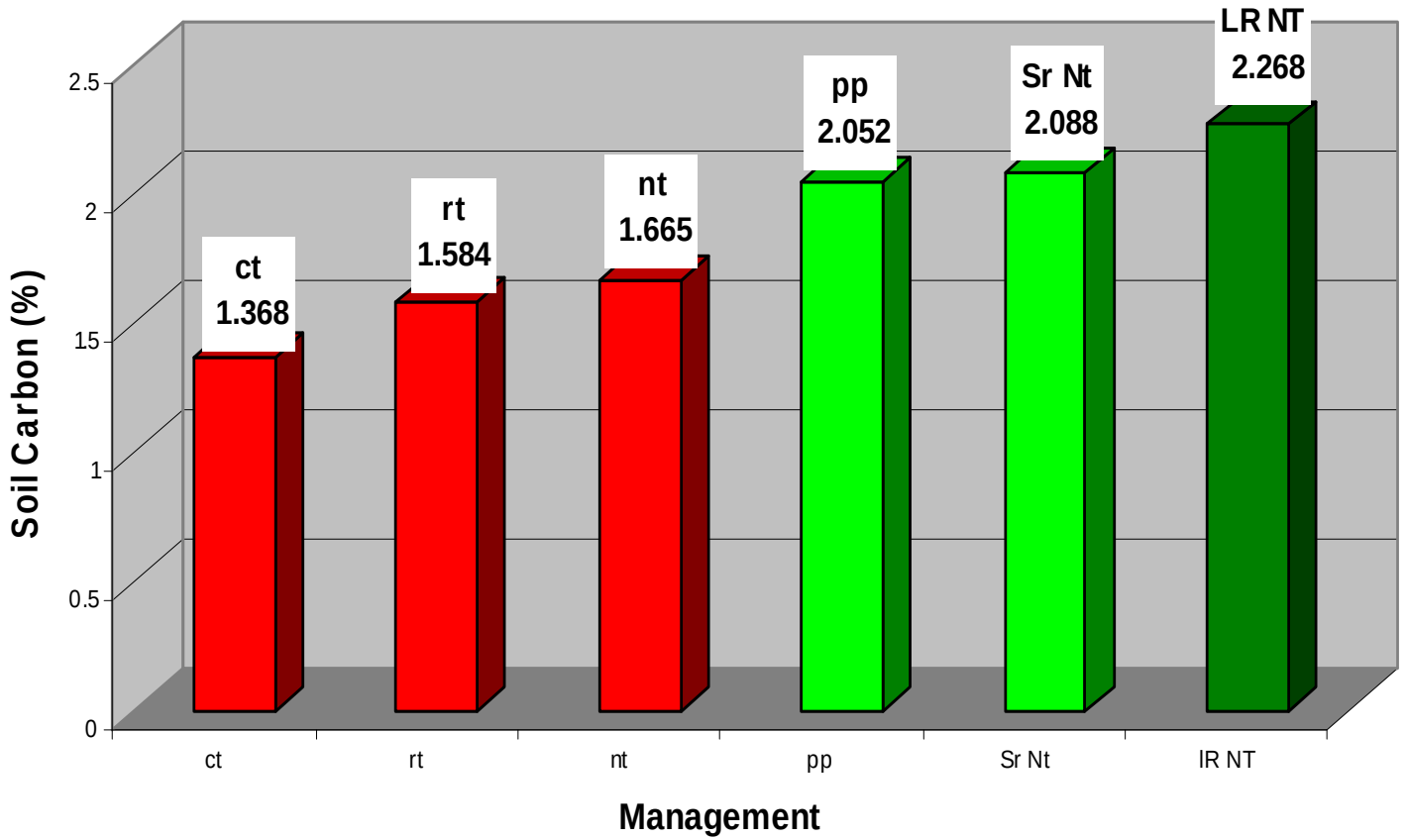
If landscapes are like this:……

…or like this.

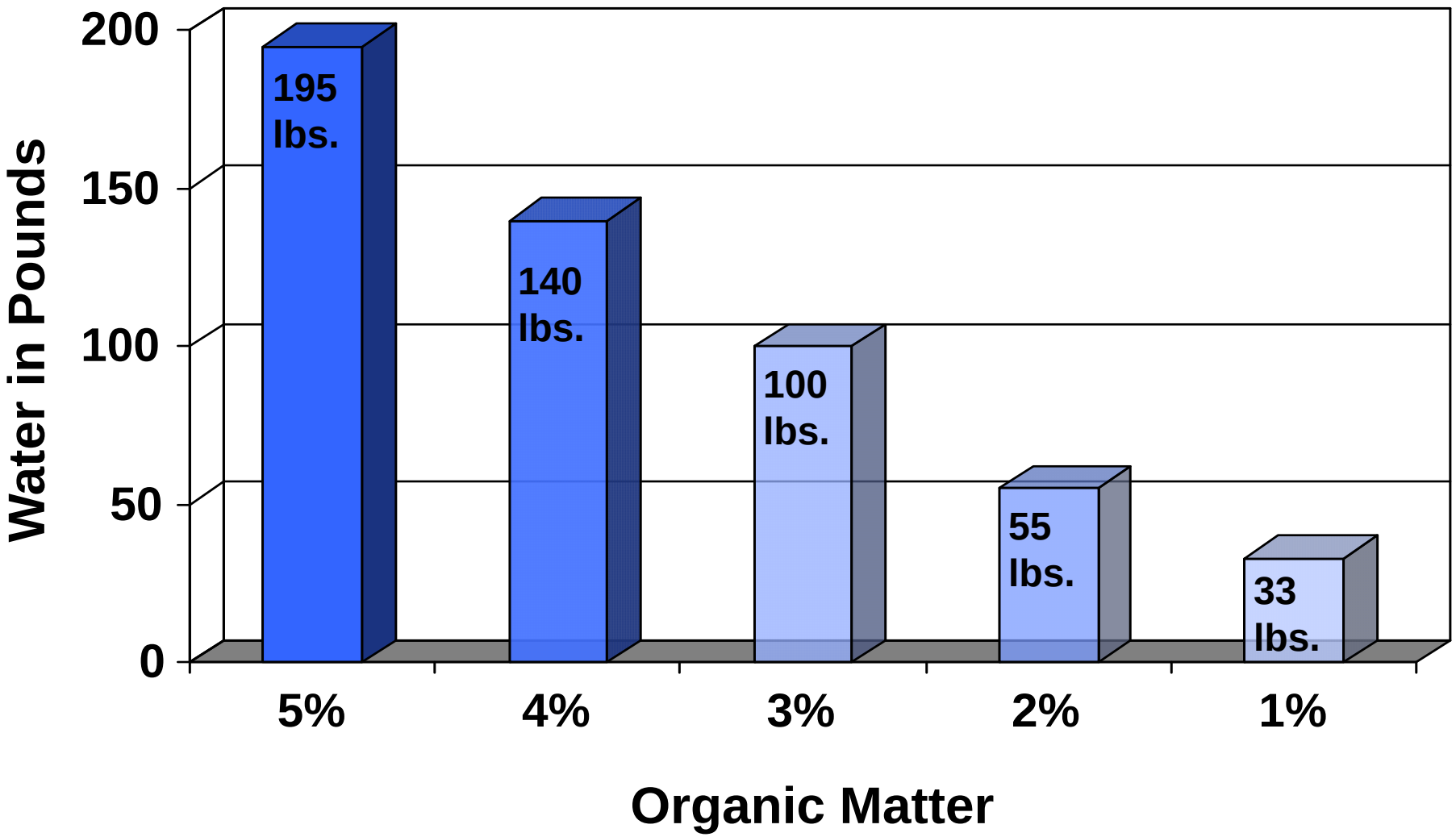
(Two rivers in the same area, with the same soils and rainfall, on the same day.)

Putting it Together

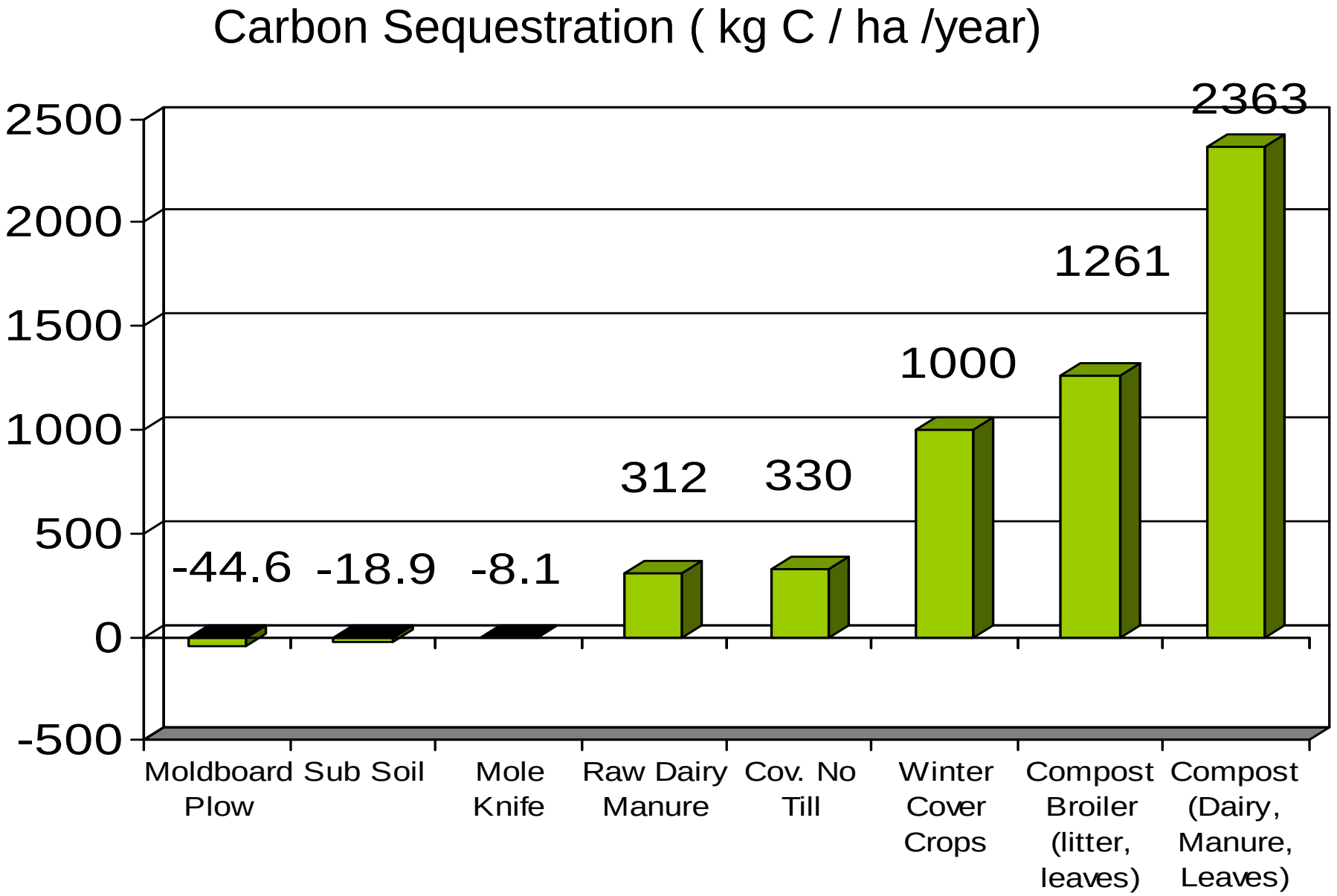
Soil carbon under continuous cropping for forage and in permanent pasture and short and long pasture rotation with no till cropping 1995 t0 1999.



Water Holding Capacity



Carbon Impact by Field Treatment



Creating New Soil

A photo from a Canadian research station showing the root growth of bunchgrass plants that were kept clipped at certain levels.

Research efforts in the soil science arena have concentrated on reducing the rate of soil loss. The concept of building new topsoil is rarely considered.

From Dr. Christine Jones, Carbon For Life, Inc.

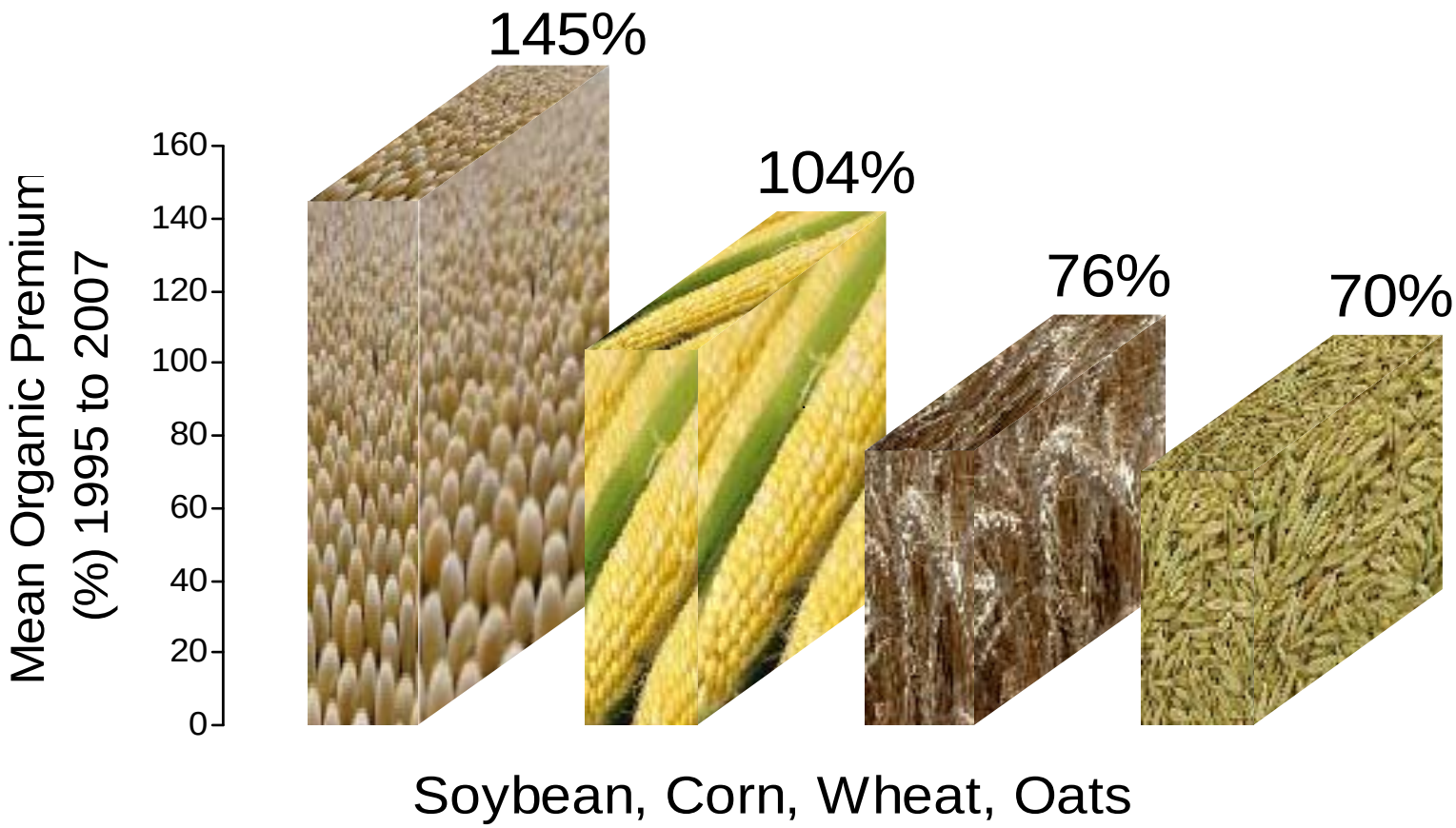
Creating New Soil

Figure 1. Root volume, rhizosphere surface area, exudation of carbon, microbial activity, humification and soil building are highly correlated with the perenniality and vigour of groundcover plants

From Dr. Christine Jones, Carbon For Life, Inc.

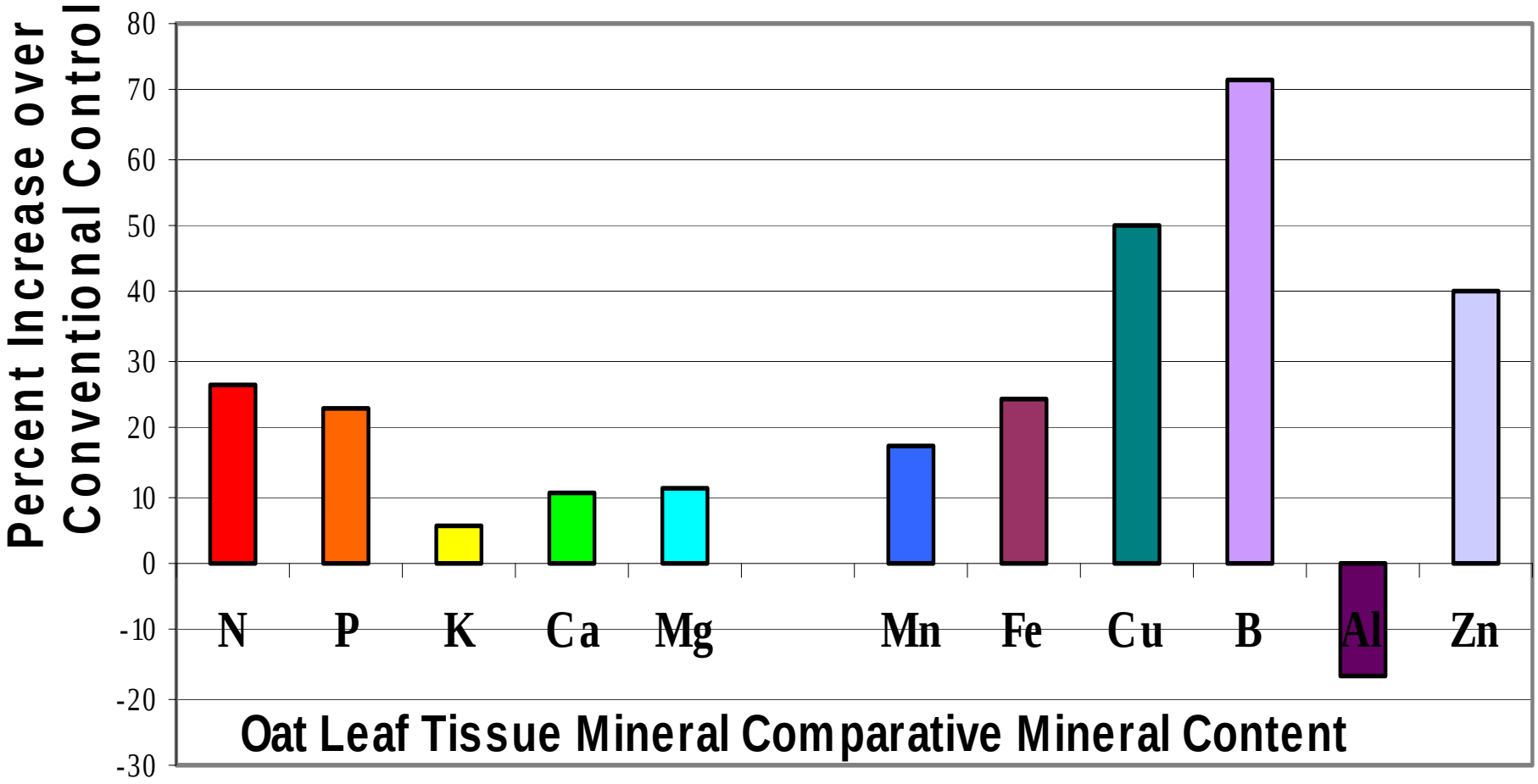
Premium Prices

1995 to 2007



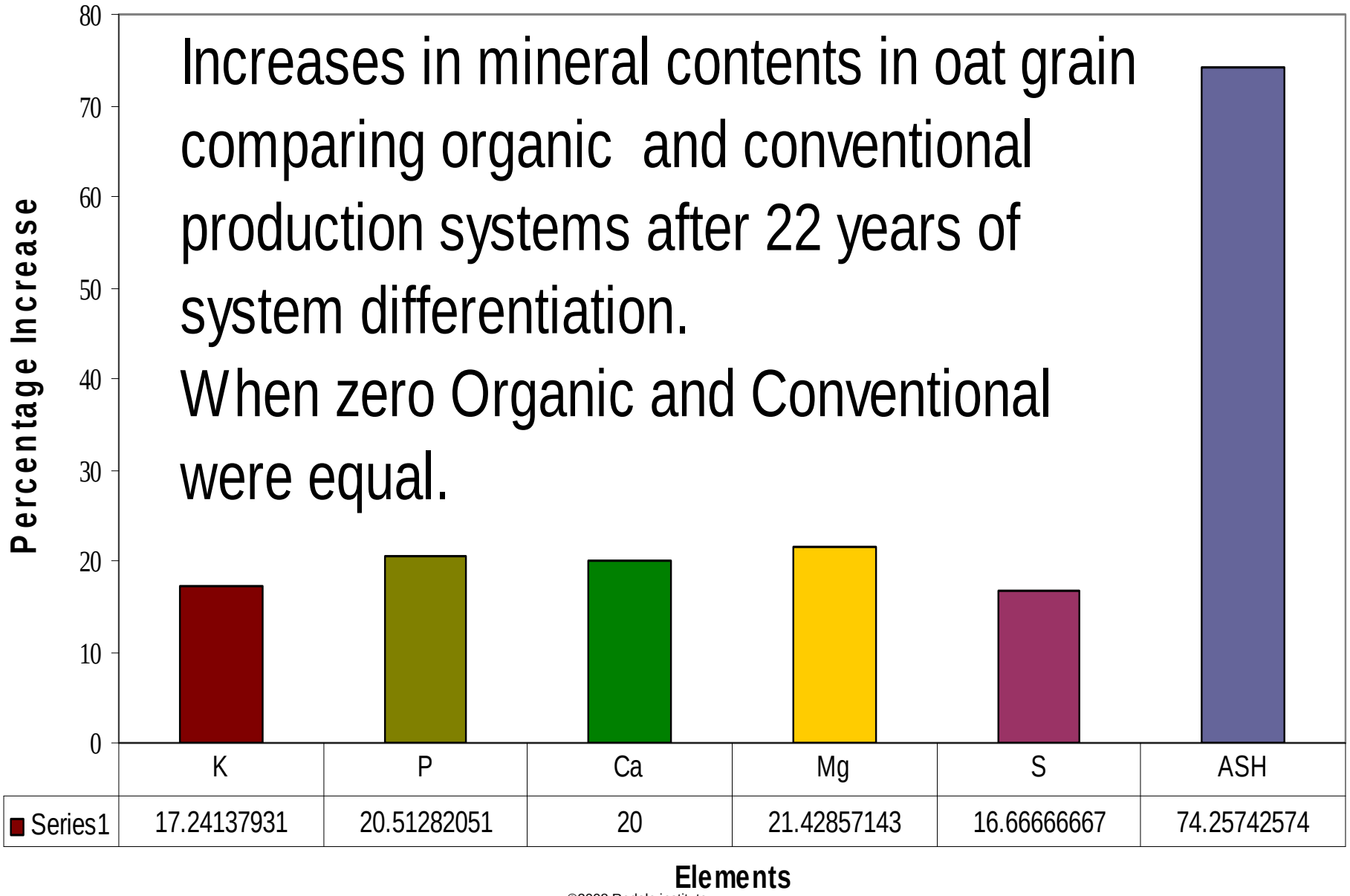
Increased Foliar Nutrients

Organic Livestock System Compared To Conventional Corn Soybean Row Crop System



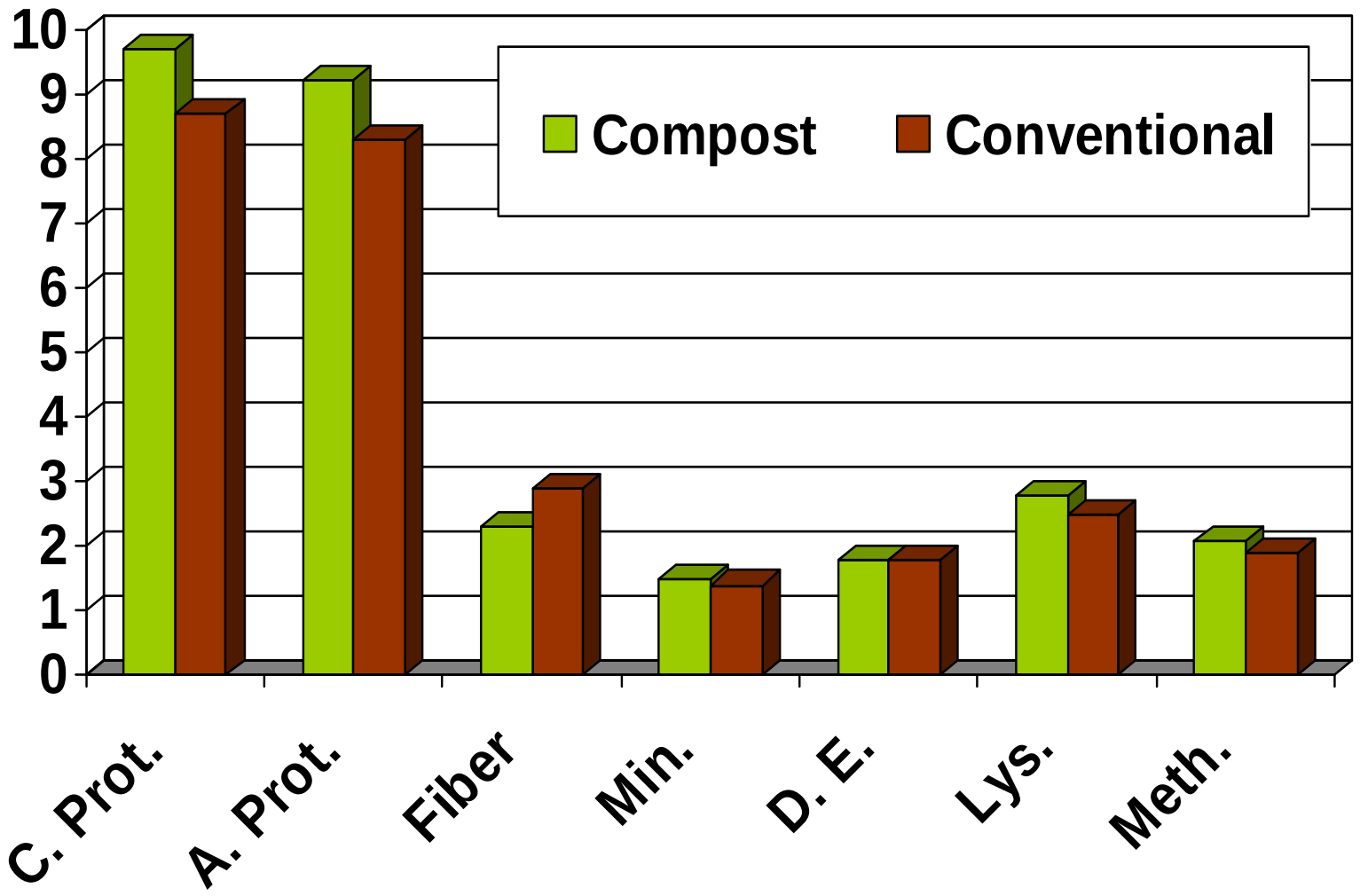
*Zero is equal to the conventional baseline.

Increased Grain Mineral Content

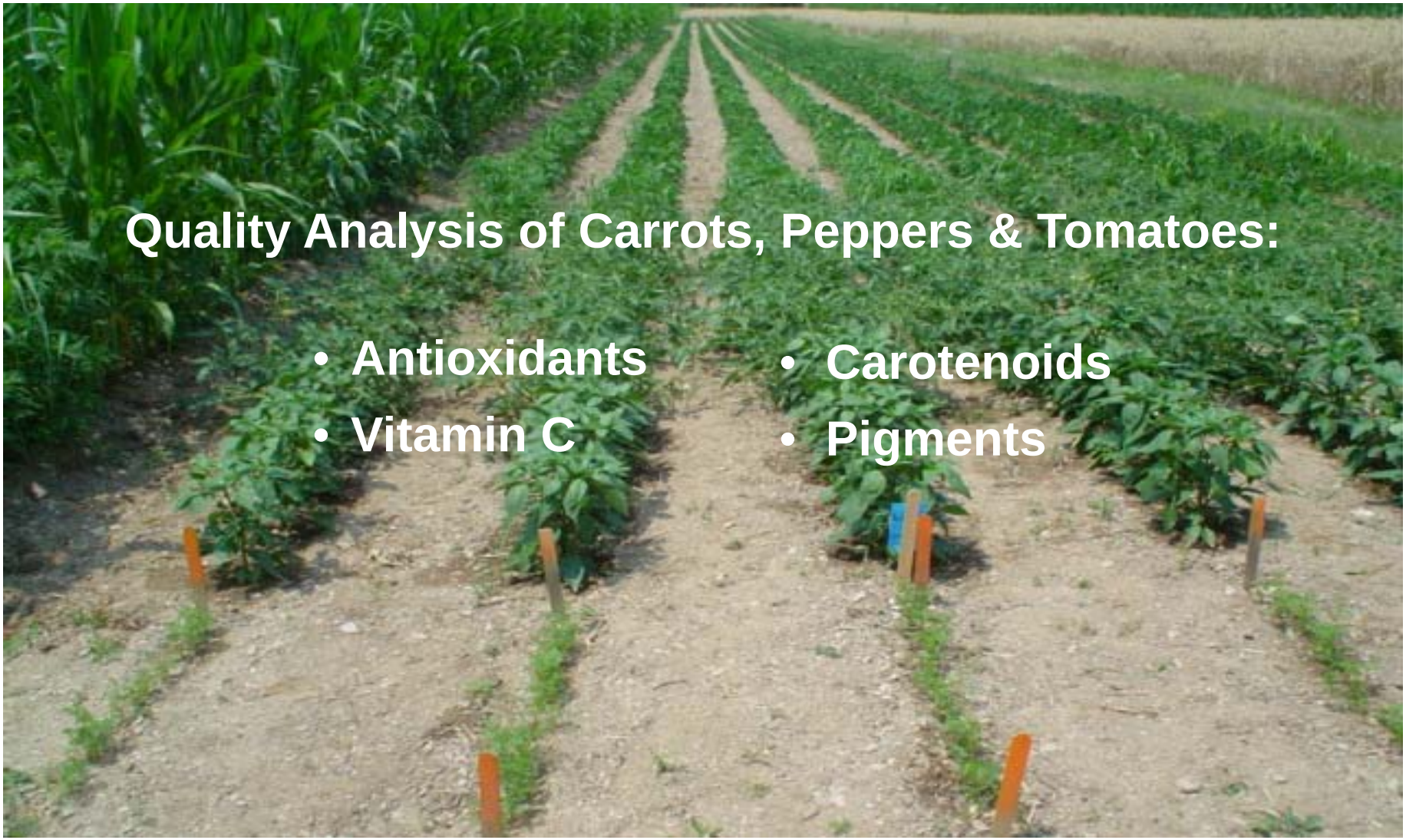


Wet Year

FST™ Corn 2005



Vegetables



Advantages

- **Better Disease reaction** to carrot necrosis and leaf blight, pepper virus complex and tomato late blight. **Equal yield** except higher in organic when disease was limiting as carrot necrosis.
- **Higher Calcium, Magnesium, Sulfur,** and **Boron** in Tomato fruit
- **Higher Calcium, Sulfur, and Boron** in Tomato leaves
- **Higher Boron and Sodium** in Carrot leaves and roots
- **Higher ascorbic acid and total antioxidants in dry environment for tomato , peppers, and carrots**

Ecological Regeneration

1. **Building Soils**
2. **Cleaning up Waterways**
3. **Improving Water Dynamics**
4. **Avoid Drought & Floods**
5. **Improve Yield Productivity**
6. **Increase Adaptability to Climate Change**
7. **Improve Food Quality**

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Conservation Agriculture

Questions

Thank You