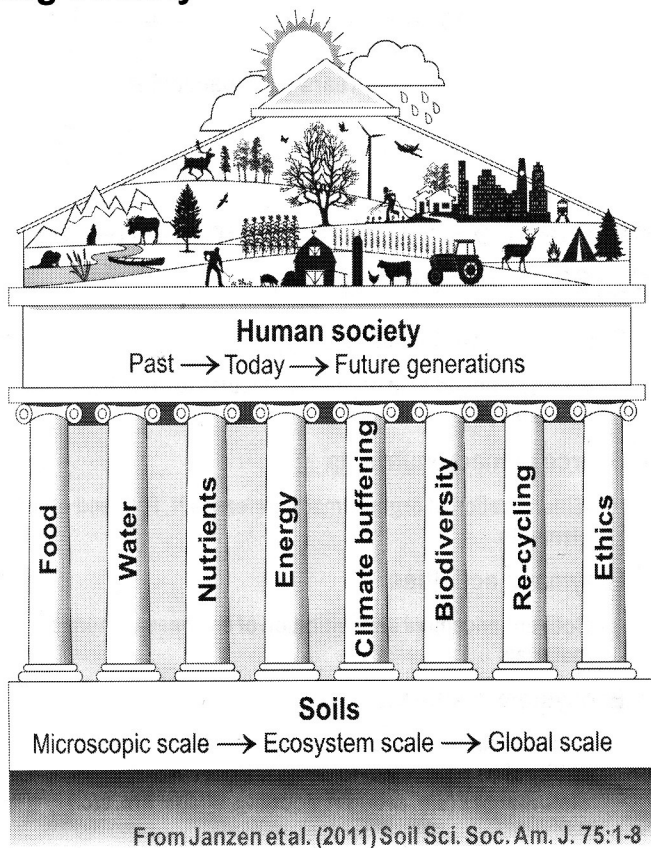


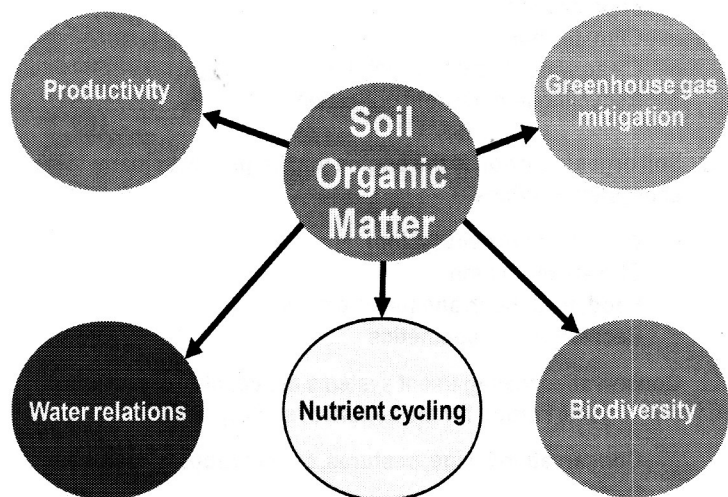
Soil Organic Matter: *How, Why and What for?*

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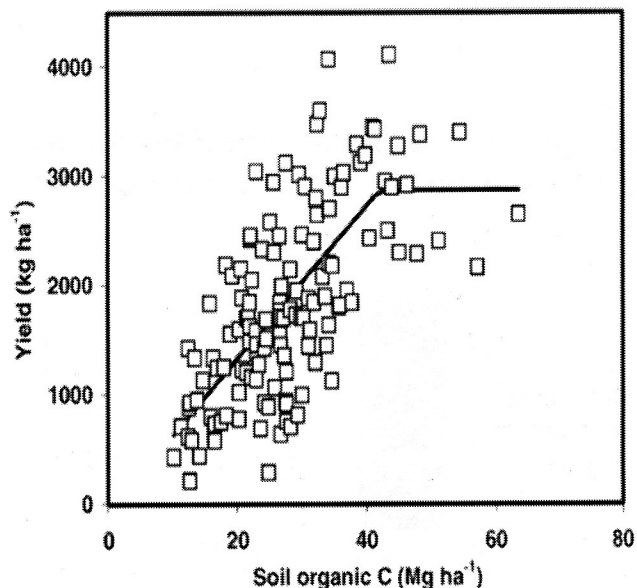
1. Soil underpins many critical issues facing society



2. Organic matter is an important indicator for ecosystem services provided by soil



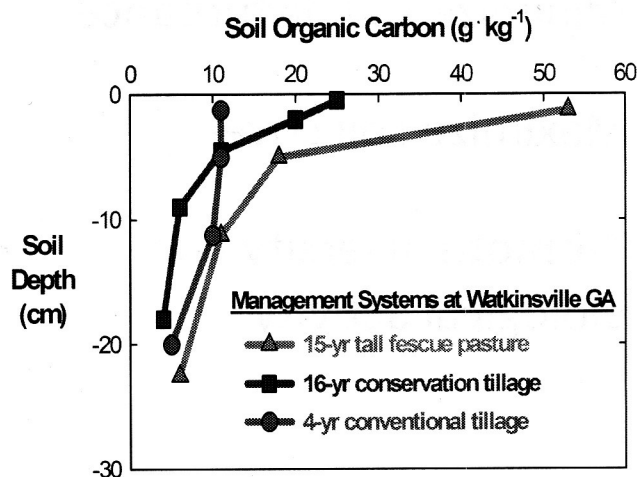
3. Achieving or maintaining maximum soil organic matter storage is beneficial to crop productivity



From Diaz-Zorita (1999) Agron. J. 91:276-279

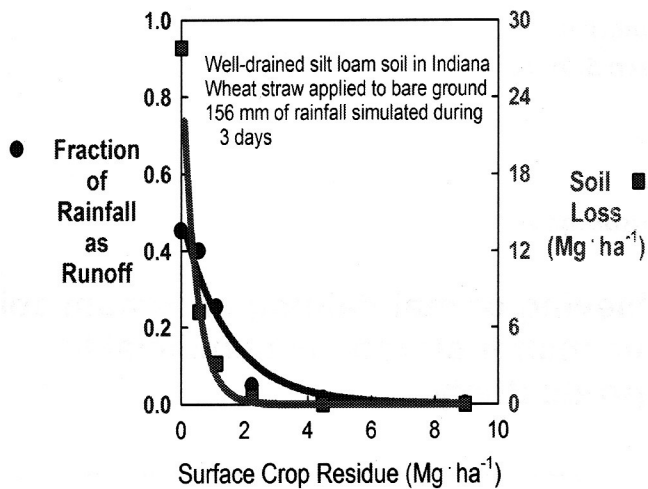
From 134 farmer fields in Argentine Pampas, 3 years of wheat yield data (3000 kg/ha = 45 bu/acre), soil organic carbon from 0-8" depth

4. Organic carbon is distributed differently in soil depending on how soil is managed



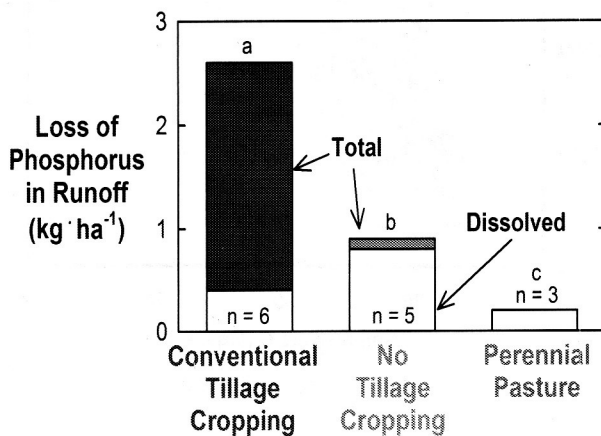
From Schnabel et al. (2001) Ch. 12, Pot. U.S. Grazing Lands Sequester C. Lewis Publ.

5. Surface residue and soil organic matter are important for controlling erosion



Data from Mannering and Meyer (1963) Soil Sci. Soc. Am. Proc. 27:84-86

6. Nutrient loss is diminished with less soil disturbance and permanent cover

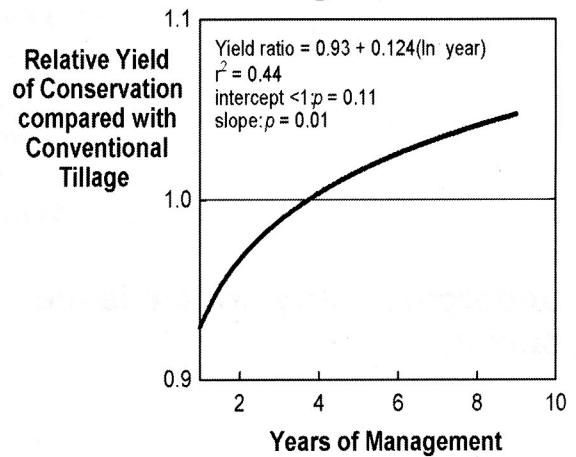


Summarized in Franzluebbers (2008) J. Integr. Biosci. 6:15-29

7. Principles of conservation agricultural management

- ✓ Minimize soil disturbance
- ✓ Maximize soil cover
- ✓ Promote diversity and biological activity

8. Time is needed for conservation agricultural systems to mature and become self-sustaining



Data from multiple sources
Reported in Franzluebbers (2005) Soil Till. Res. 83:120-147

9. Importance of soil organic matter to biological soil quality

- ✓ Reservoir of metabolic energy
 - Energy embedded in organic molecules to drive biological processes
- ✓ Source of macronutrients
 - Mineralization of organic matter releases N, P, S, and other elements
- ✓ Enzymatic activities
 - Both enhancement and inhibition of enzymes by humic materials
- ✓ Ecosystem resilience
 - Accumulation of soil organic matter can enhance the ability of an ecosystem to recover from various disturbances (e.g. drought, flooding, tillage, fire, etc.)

10. Conclusions

- Soil is vitally important to many global issues facing society in the coming decades
 - Food security
 - Climate change
 - Clean water and its availability
 - Recycling and nutrient utilization
- Soil organic carbon is the engine that helps power many ecosystem services
 - Water and nutrient cycling
 - Climate regulation
 - Food, feed, fiber, and fuel production
 - Recreation and aesthetics
- Conservation management systems are capable of restoring soil organic carbon for the benefit of society
 - Conservation tillage, pastures, cover cropping, manures