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# BEST PRACTICES FOR SOIL CARBON MANAGEMENT, LAND PRODUCTIVITY AND CROP YIELD

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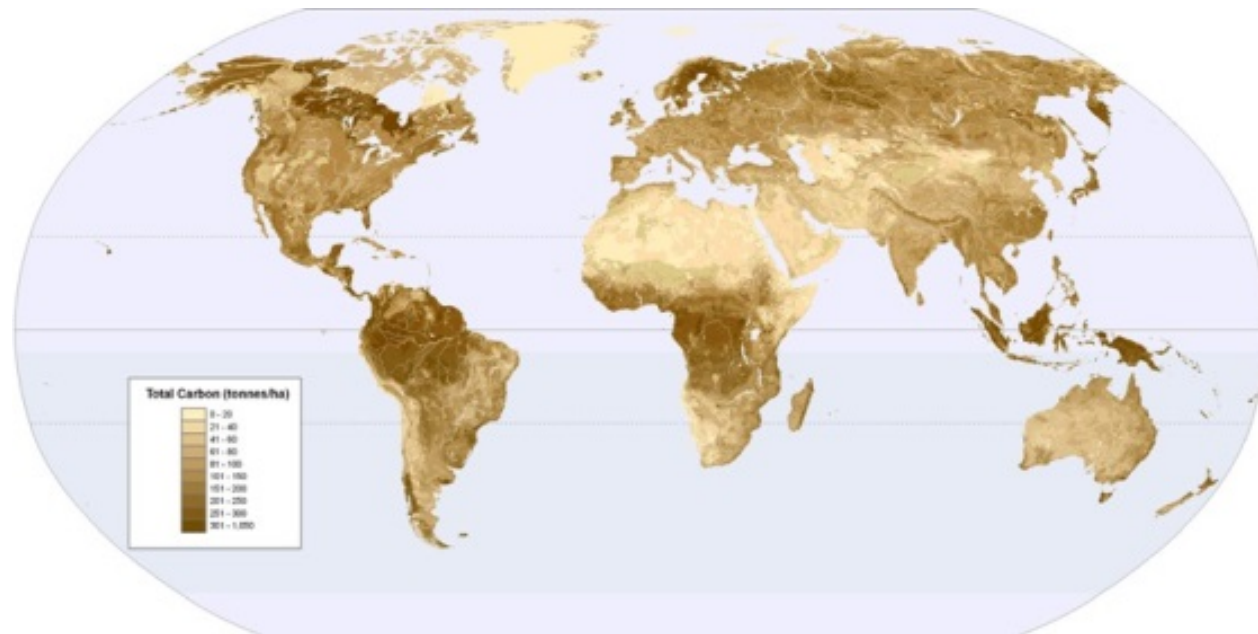
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SOIL CARBON MANAGEMENT  
GLOBAL SOIL WEEK, BERLIN

28-OCTOBER 2013

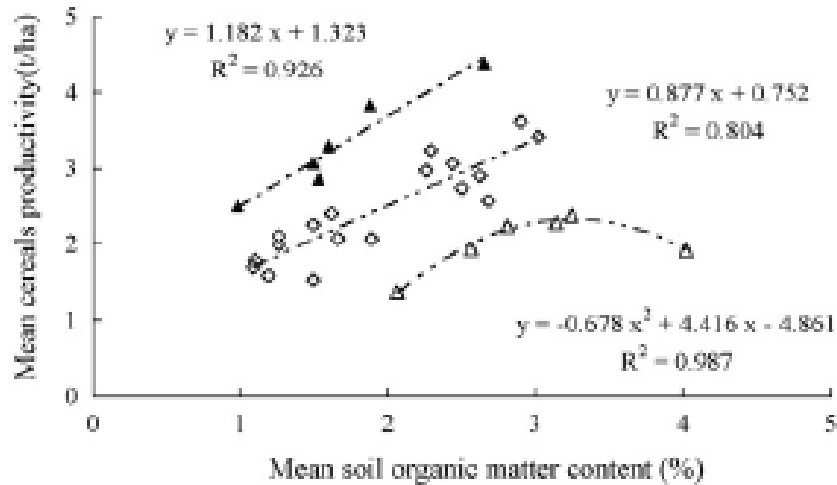
# Issues

- Soil management affects soil quality and soil C content
- Soil C affects soil functioning and thus productivity
- How can we manage our land to increase yields and yield stability?

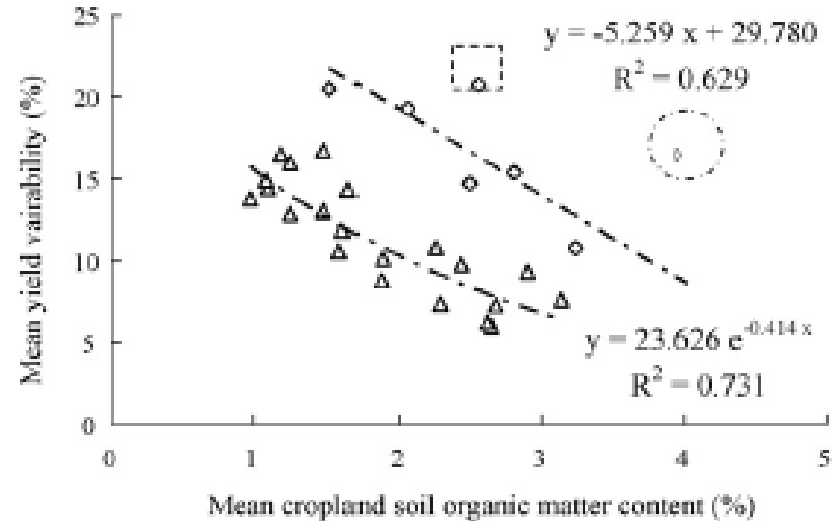


Total Carbon (t/ha) [UNEP-WCMC updated Global Carbon Map]

# What does soil carbon do for us?



China: Mean cereal productivity vs. SOM for blocks of Chinese provinces, 1949-1998

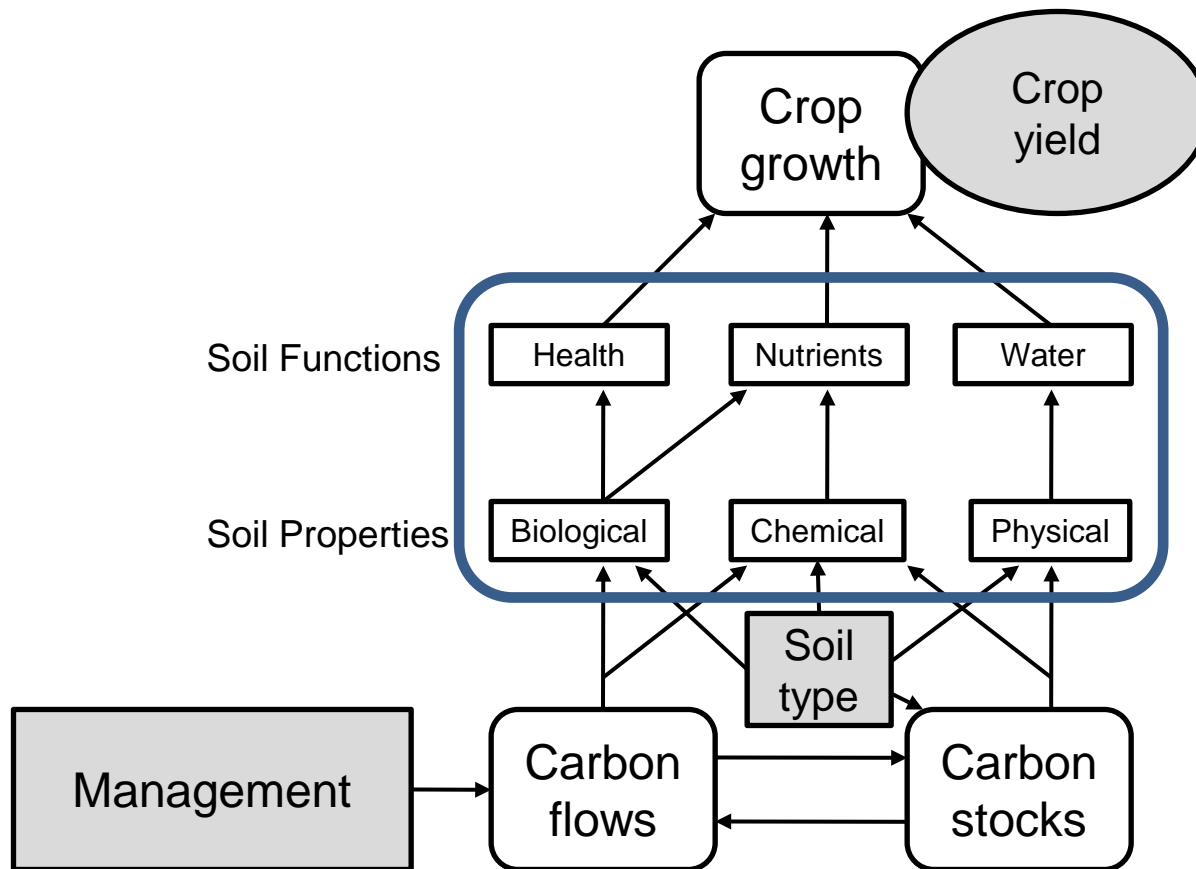


China: Mean cereal yield variability (%) of Chinese provinces, clustered according to climate

# What does soil carbon do for us?

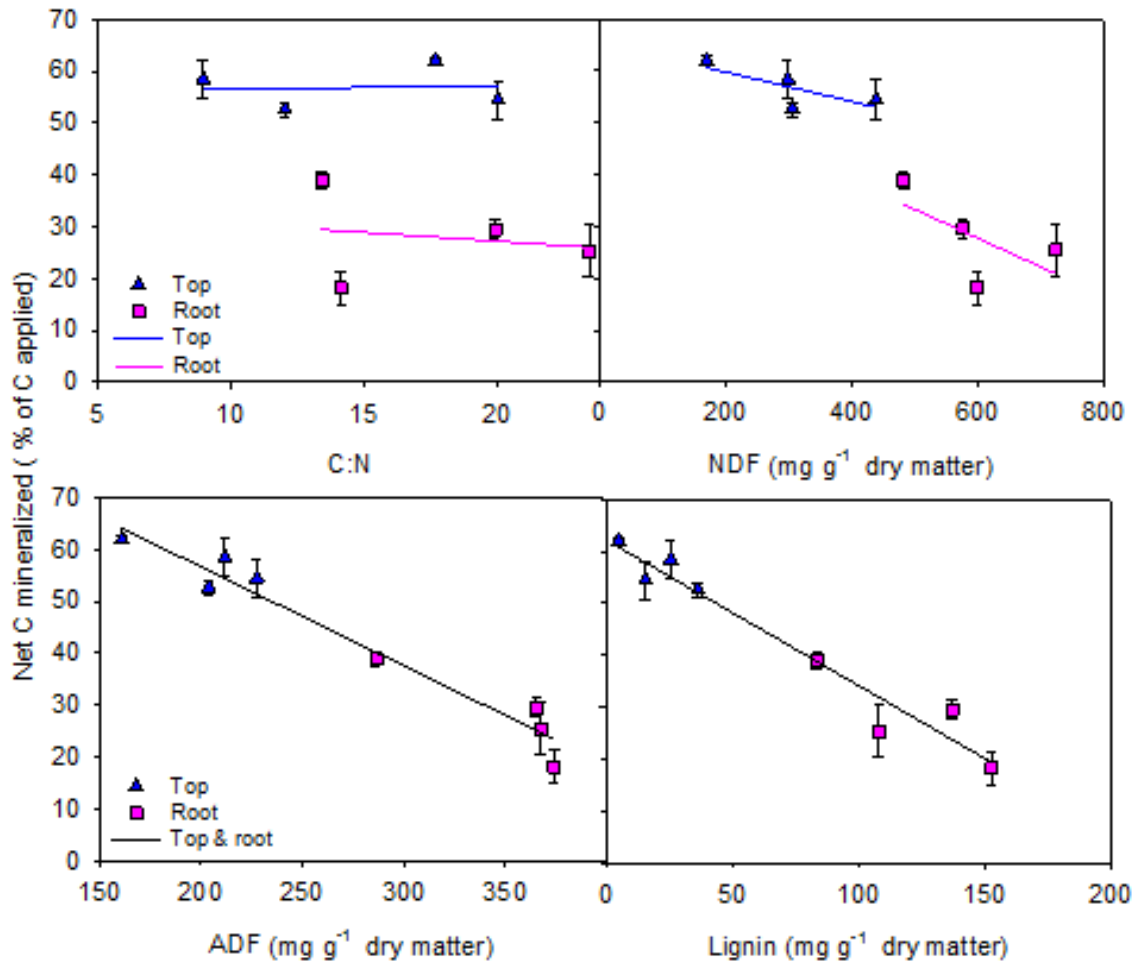
- SoilOrganicCarbon (SOC) is the main constituent of soil organic matter (SOM)
- SOM is formed by decay of above- and below ground organic material (leaves, residues, roots, soil biota)
- SOM improves the physical properties of the soil (porosity)
- Affects water holding capacity
- Contributes to the structural stability of clay soils
- SOM supplies N and other minerals for crop nutrition
- C flows fuel the activity of soil organisms

# Relations between management and yield



# C decay rates for top and root

*Carbon has short and long residence times in the soil*




Incubation study. Four types of green manure.

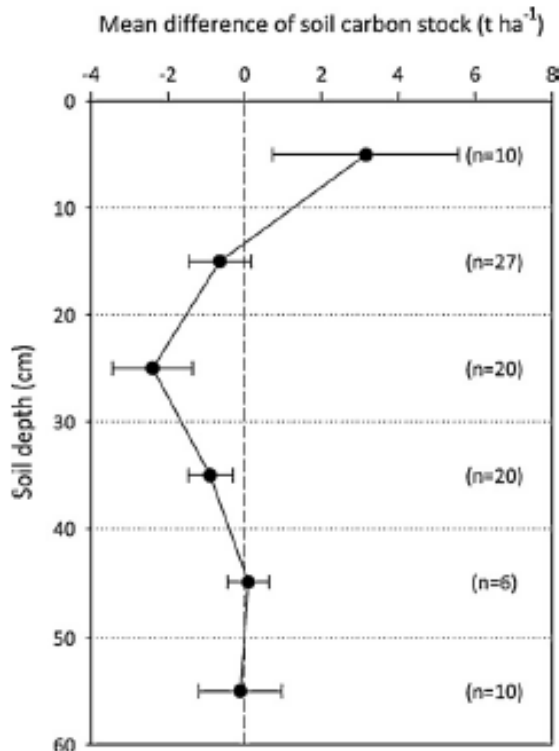
Net C mineralized in 100 incubation days, as related to C:N ratio, fibres, and Lignin in the incubated plant material.

*(Li and Olesen, unpubl. 2013).*

Root-derived C is more resistant to decay than shoot-derived soil C  
(Rasse et al. 2005)

# Soil carbon management

- Increase C input to the soil 
- Minimize C losses from the soil



Review: 69 paired tillage experiments. Mean difference of carbon contents of soils under conventional tillage and no-tillage. (Luo et al. 2010)

Conversion from conventional tillage to no-tillage does not seem to increase the overall SOC stock

# Management practices

- Organic manure input
- Choice of crops:
  - Cover crops
  - Perennial crops (grasses, bioenergy crops)
  - Legumes (root biomass; N-rich)
- Incorporation of crop residues incl. straw
- No-tillage practices



# Best management practices

- Secure a continuous input and flow of C in the soil
- Promote root growth

**Thank you for your attention**