

Soil Carbon

(proxy for soil organic matter)

Locally, soil organic matter influences:

- Soil structure
- Porosity/infiltration capacity
- Water holding capacity
- Cation exchange capacity
- Microbial and faunal growth
- Nutrient availability
- pH
- Erosion control



Globally, soil contains:

Twice as much carbon as contained in
vegetation (incl. trees) and atmosphere
(as CO₂)



Soil Carbon Loss in Agricultural Systems

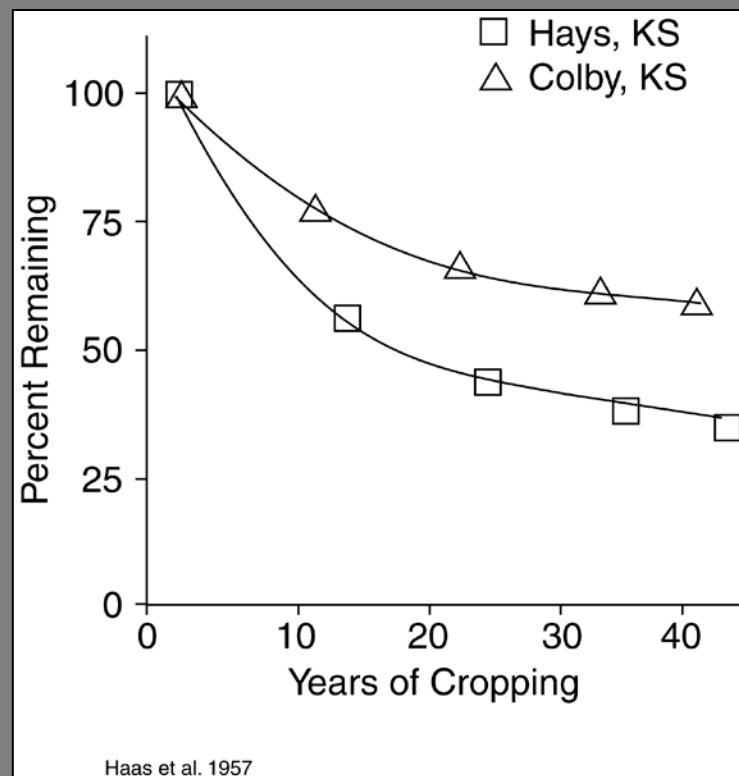
- 40-60% of original C lost after 40-60 years of cultivation in temperate regions



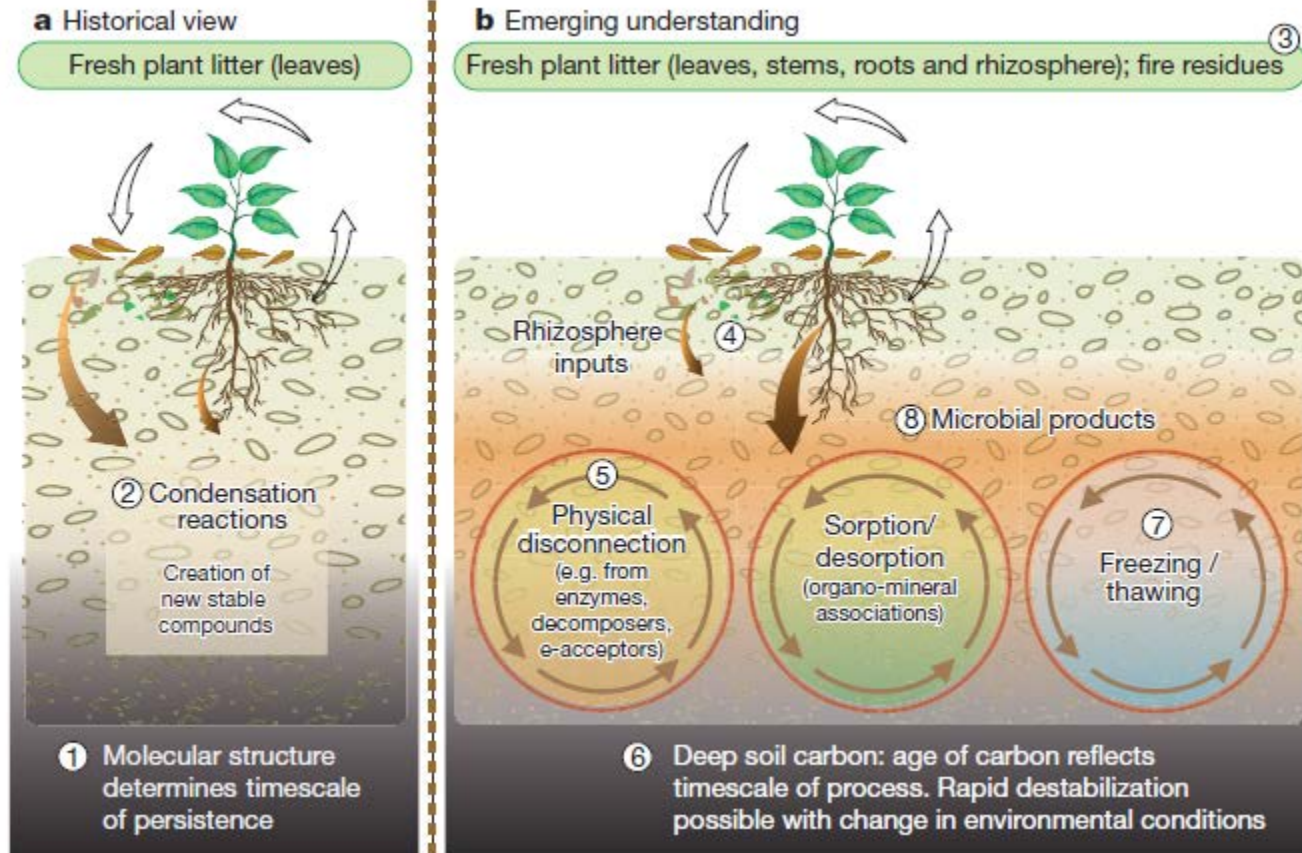
- Globally 54 Pg C from an original 222 Pg C (about 25%)



- Potential for recovering 0.3 – 0.5 Pg C y^{-1} (compare to ~ 9 Pg atmospheric annual loading rate)



Historical and Current Views of Soil Organic Matter Formation



Plant C inputs, secondary reactions, chemical recalcitrance; most C in surface soils

Roots, microbes, environmental conditions, deep carbon, physical protection; little emphasis on chemical recalcitrance

Managing Soil Carbon in the Northeast

Some considerations:

- Soils in NE have less C to lose and a lower potential to gain/store C (coarse textured, thin, rocky Inceptisols)
- How can soil C sequestration potential and actual storage be quantified and monitored?
- Climate change (altered temperature and precipitation) and nitrogen deposition will interact with management
- Management practices that maximize soil C storage and crop/forage yield may also stimulate trace gas emissions (e.g., N₂O)
 - look at total global warming potential
 - cost-benefit analysis

