

# Browning the green revolution

BodemBreed

November 2012, Hanneke Heesmans



# Organic matter functions

- Nutritional; organic matter increases the soil fertility by releasing nutrients available for plant uptake.
- Soil physical; it helps to improve the soil structure, increase water retention and cation exchange capacity and reduce nutrient losses.
- Biological: provides energy and affects activity of soil micro organisms.

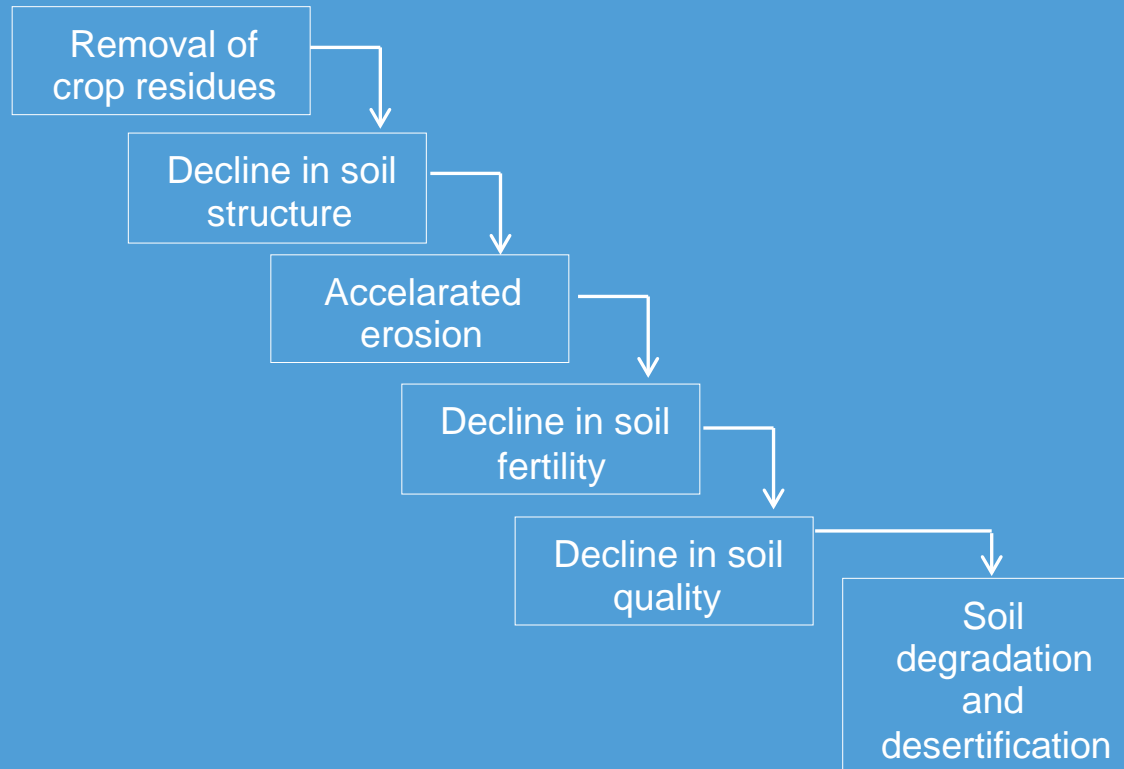


# Carbon dilemma

- Carbon is stored in the soil through the addition of organic matter
- Carbon is released as carbon dioxide through decomposition of organic matter
- Can we profit from its decay and mineralization and opt for storage and less CO<sub>2</sub> at the same time or must one choose for one of two?

The soil carbon dilemma: Shall we hoard it or use it? H.H. Janzen, 2005

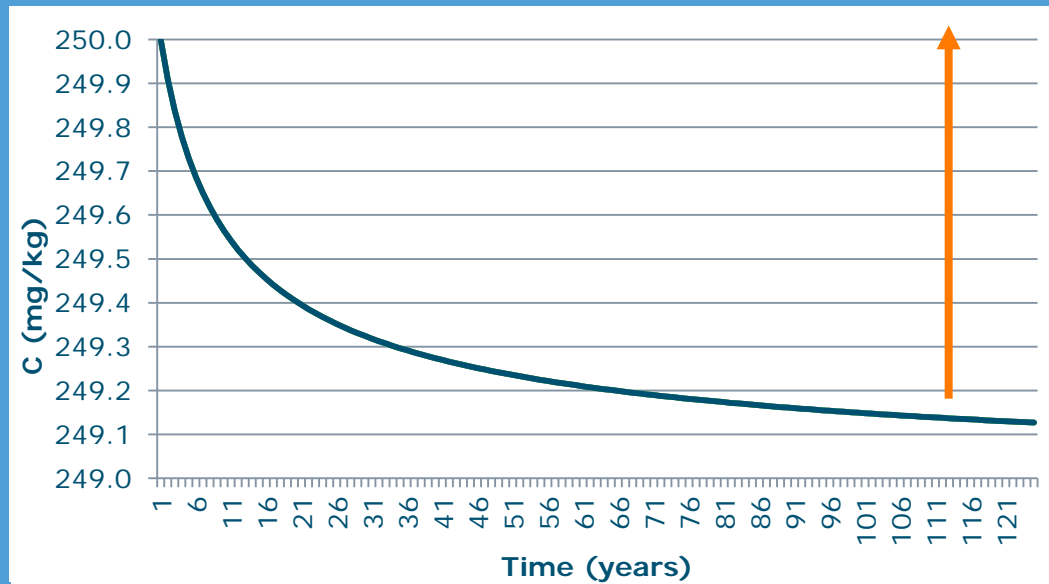
# Carbon cannot be fully taken away from the soil



Lal, 2008



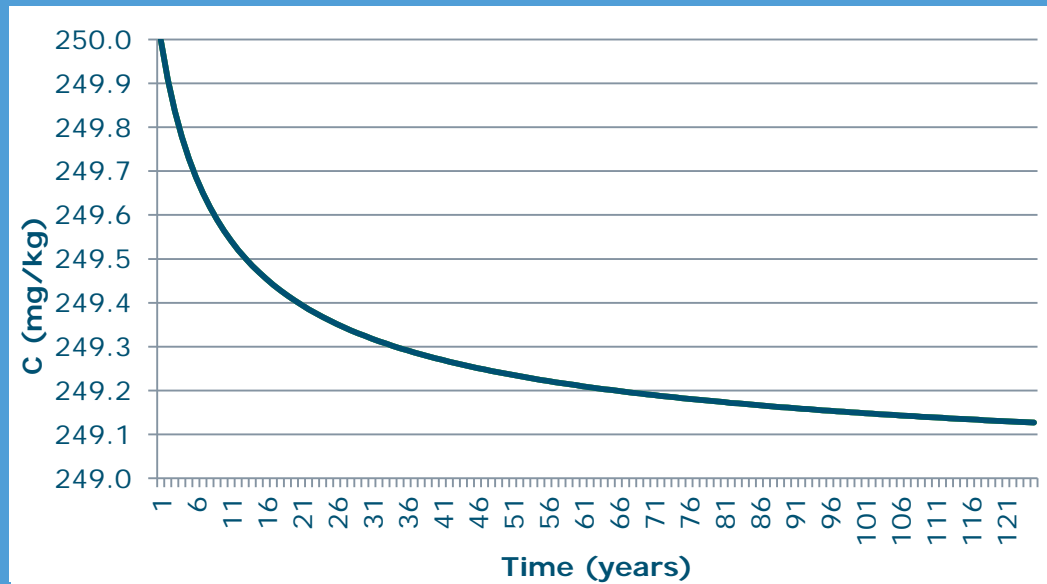
# Soil carbon management



- How much carbon is needed to restore the required level of soil organic matter?
- And which carbon source does one use?



# Soil carbon management

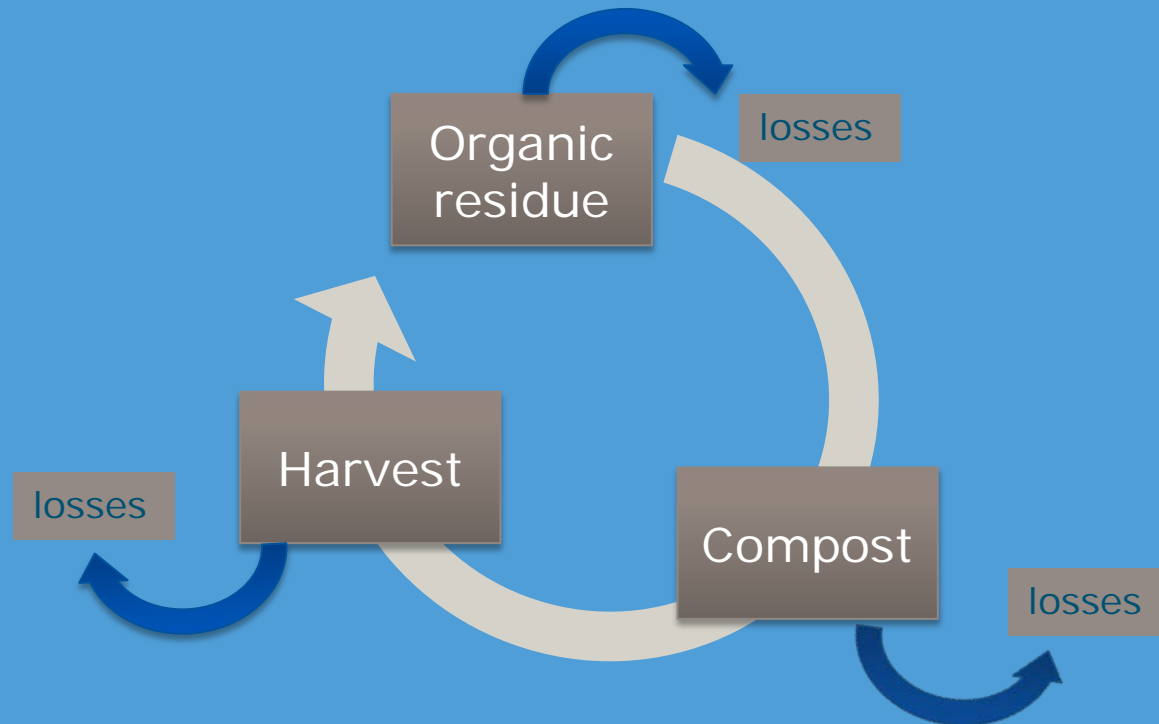


- Trend in the future: more carbon will accumulate close to the cities; carbon piling.



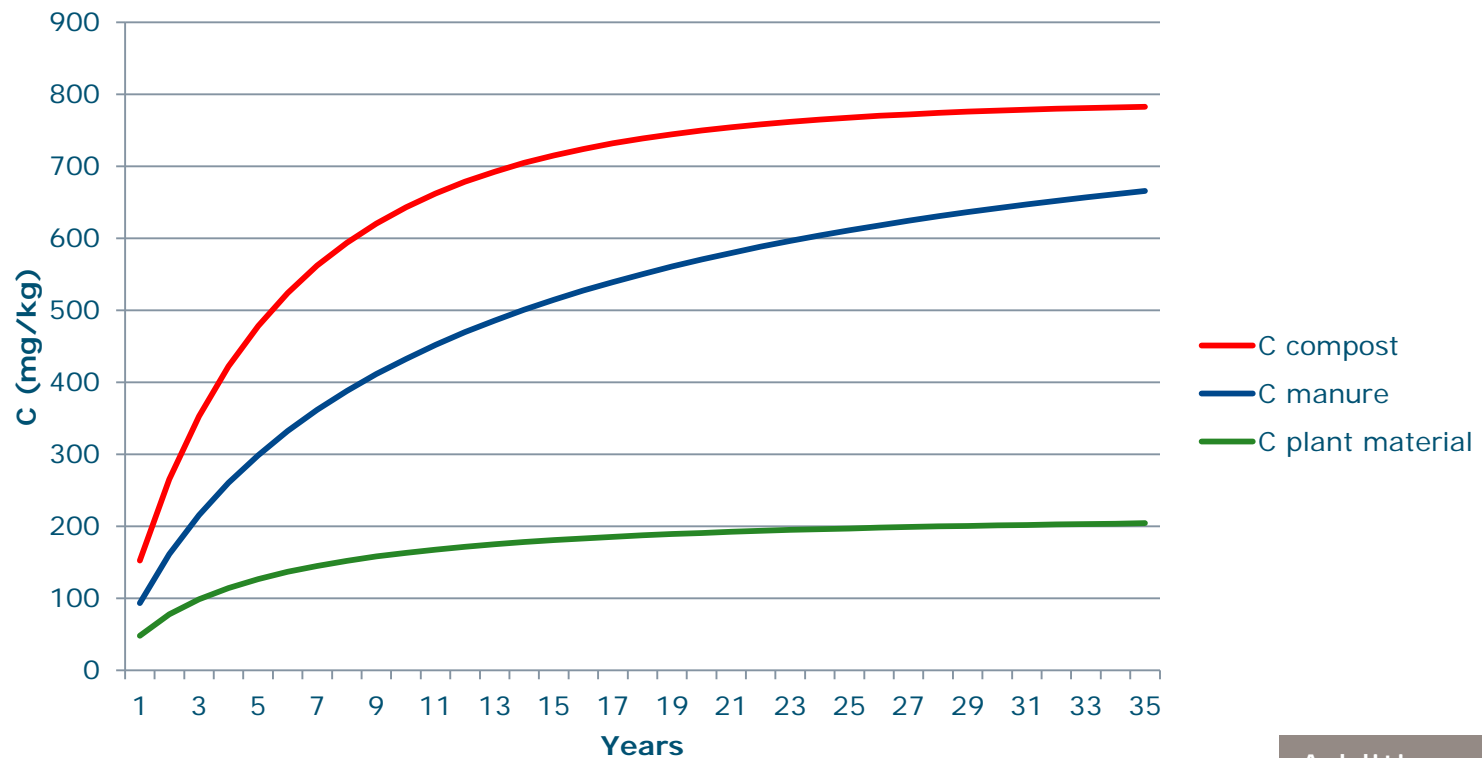
# Project

- BOCI-Project on compost use in Ethiopia and Kenya. Model for compost application.



# Results

## C sequestration of three young organic matter materials with yearly additions

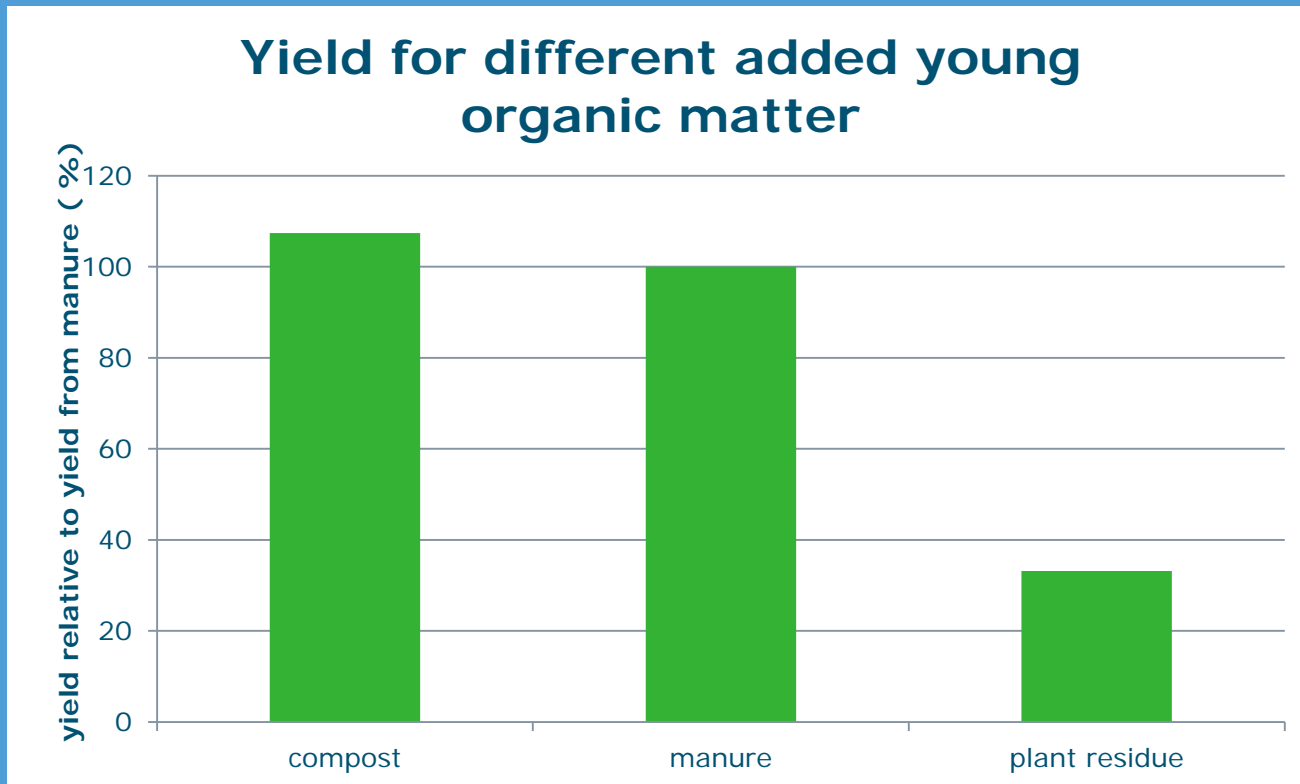


Addition of fixed amount of young organic carbon per year



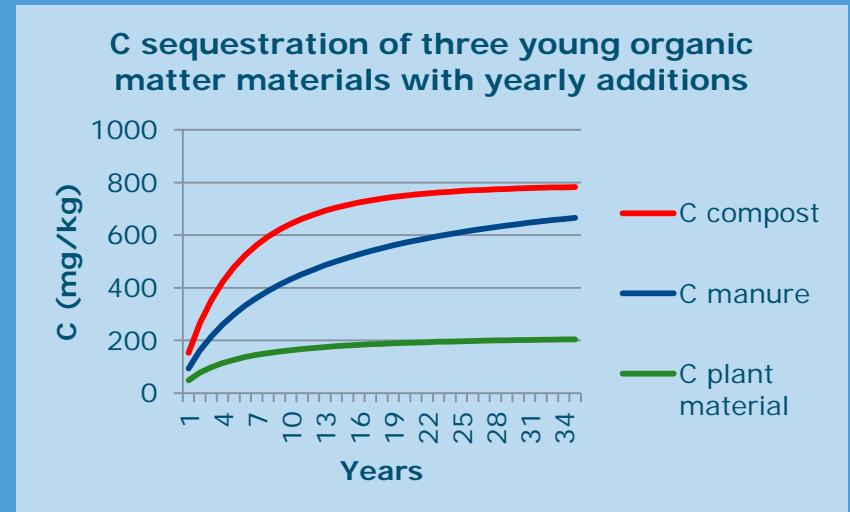


# Results on yield prognosis



# Likely outcome

- After 35 years minor differences in yield between compost and manure
- Compost additions will increase levels of soil organic carbon faster than manure
- Likely yield benefits from compost will start sooner than benefits from manure additions



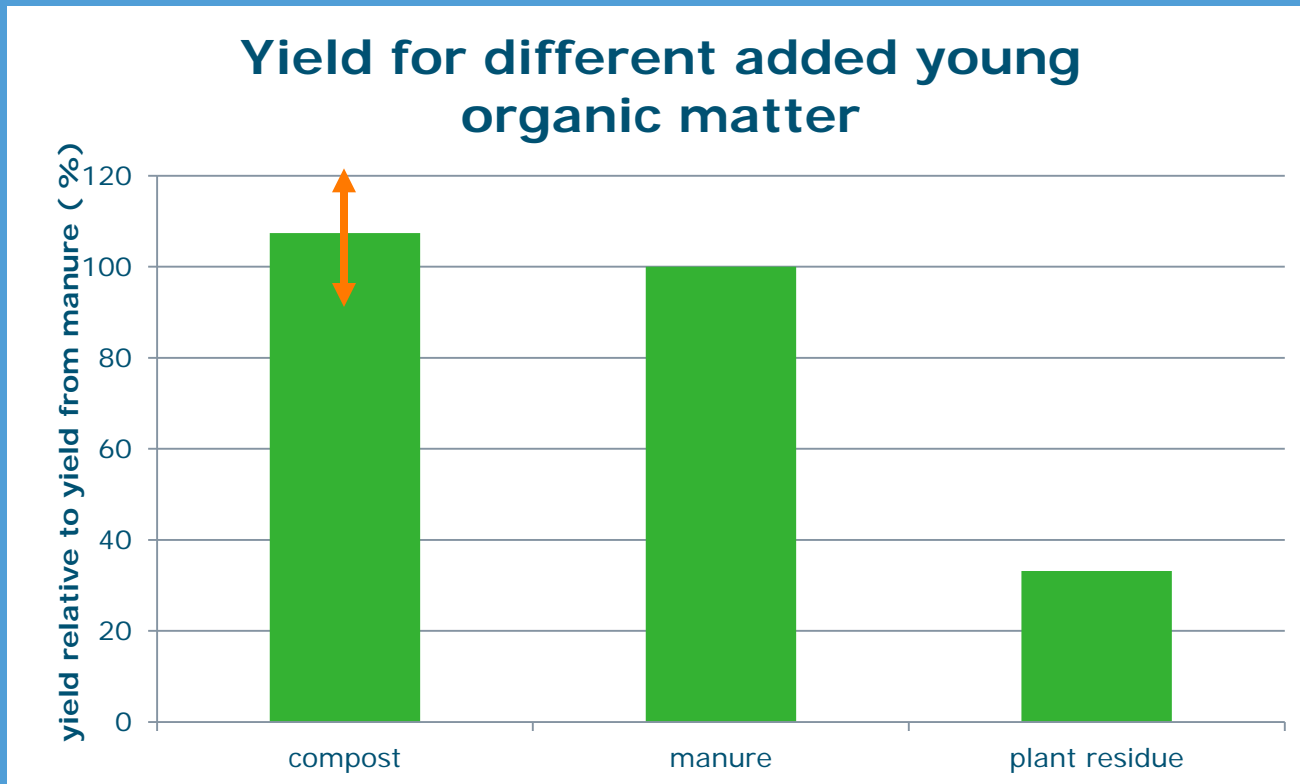
# Questions in the project

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- How can we adjust carbon management in such a way that we can optimize carbon release and carbon storage in the soil?
- Can we adjust the timing of decay such that we address both carbon storage (low carbon footprint) and mineralization (sustain food supply security)?



# Results on yield prognosis



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# Questions in the project

- How can we adjust carbon management in such a way that we can optimize carbon release and carbon storage in the soil?
- Can we adjust the timing of decay such that we address both carbon storage (low carbon footprint) and mineralization (sustain food supply security)?
- What is the role of compost in the future use of carbon from residues?
- How do you optimize processing residues to (more) effective compost?

