

# Soil organic carbon

**Sylvia Nyawira**

Agriculture and Environment Scientist

*Alliance for Biodiversity International, CIAT*



Alliance

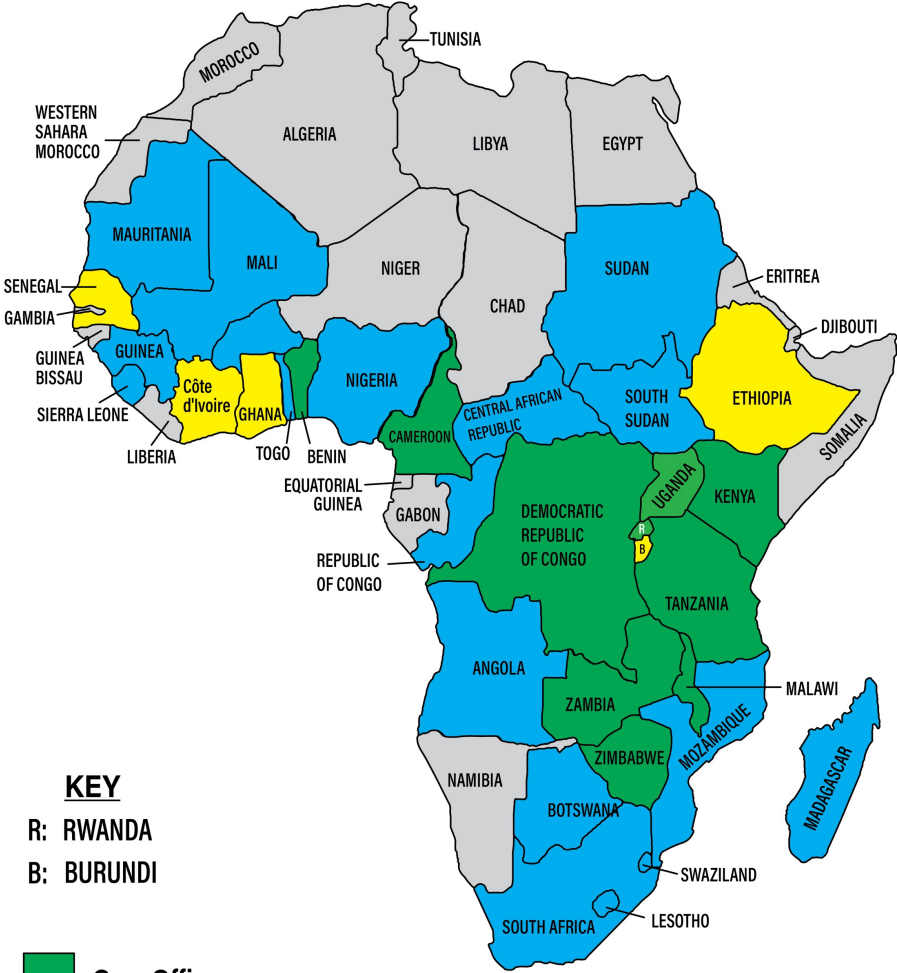


# Soil health and soil carbon – insights from selected sites in East Africa

Sylvia Nyawira  
Multifunctional Landscapes  
[s.nyawira@cigar.org](mailto:s.nyawira@cigar.org)  
Nairobi; 13 July 2023



# The Alliance in Africa



**KEY**  
 R: RWANDA  
 B: BURUNDI

**Own Office**  
**Hosted**  
**Presence**



# What makes soils fertile?



# Soil organic matter – Key determinant for ecosystem services



Ecosystem services: benefits people obtain from ecosystems (MEA 2005)



# Long-term Trials since 2003



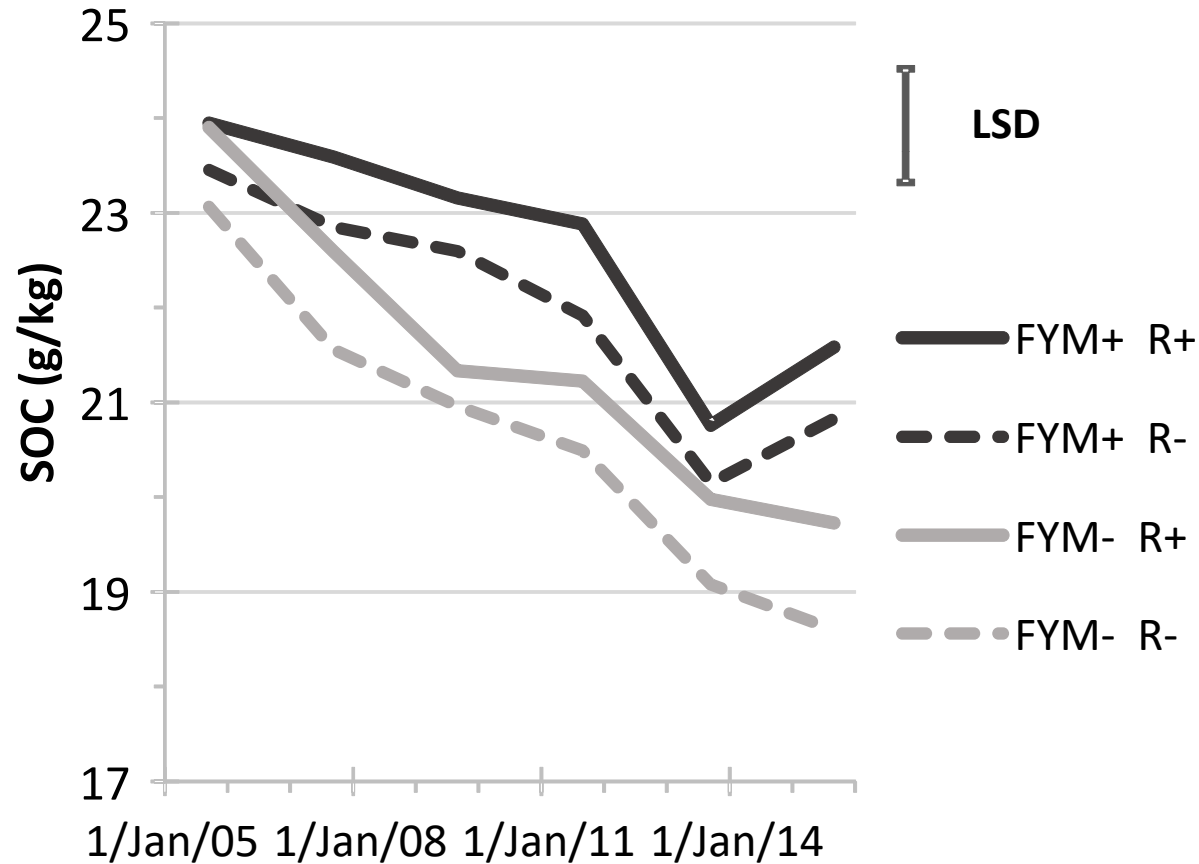
- Rotations with tephrosia
- Intercropping maize and soybean
- Application of manure
- Fertilizer N and P variations



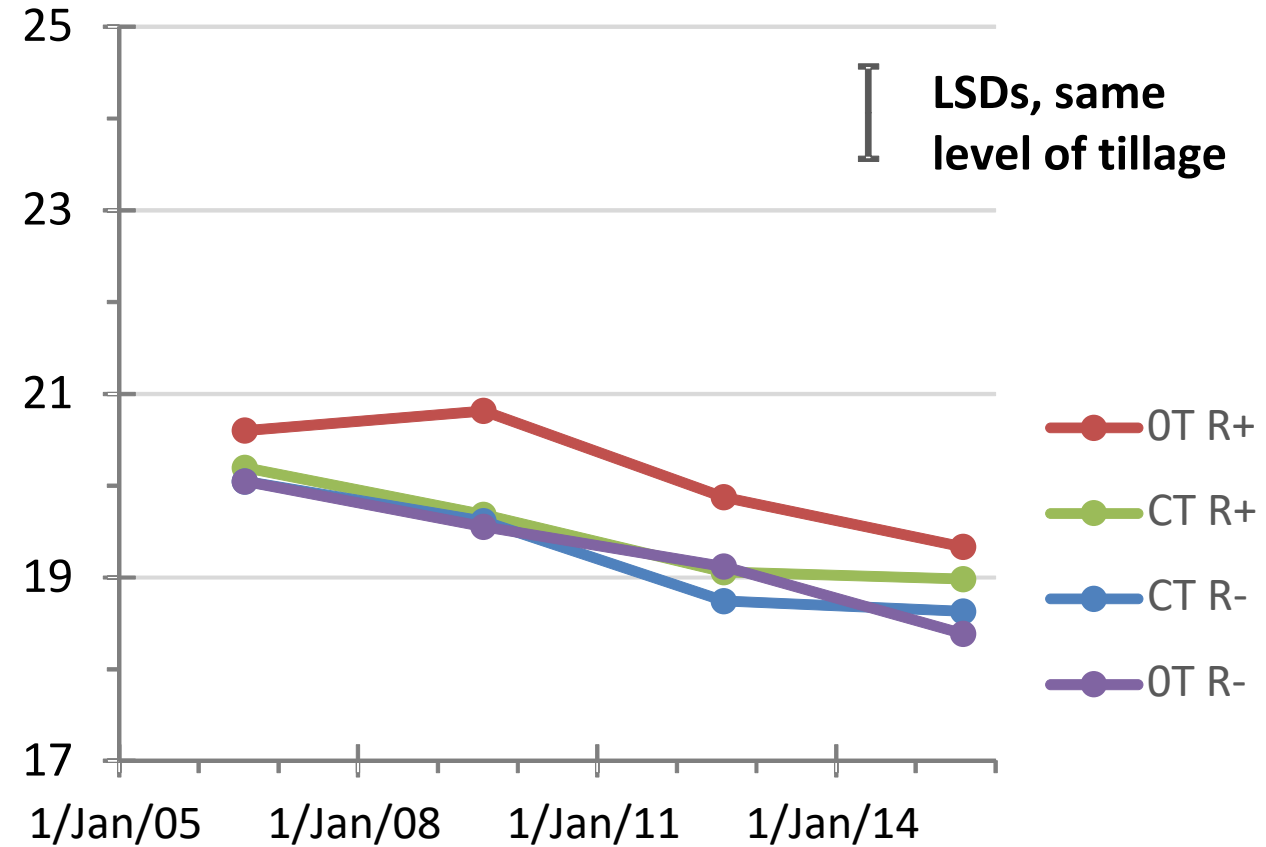
- Minimum tillage with residues
- Rotations with soybean
- ← • Intercropping maize and soybean
- Fertilizer N and P variations

# Observed long-term changes in SOC under improved management

## ISFM



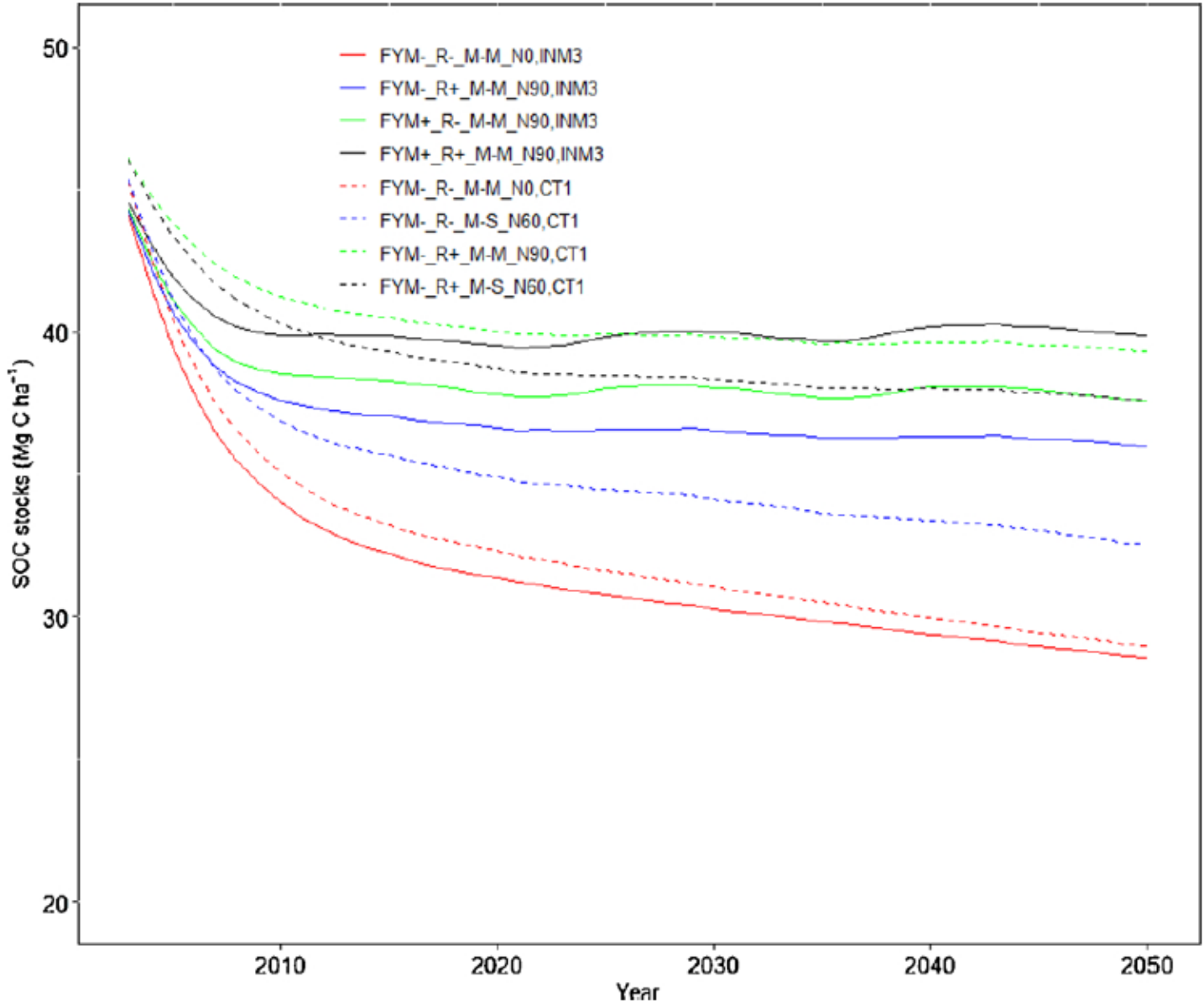
## Conservation Agriculture



**Losses in soil carbon detected in cropping systems with improved management**



# Projected changes in soil organic carbon



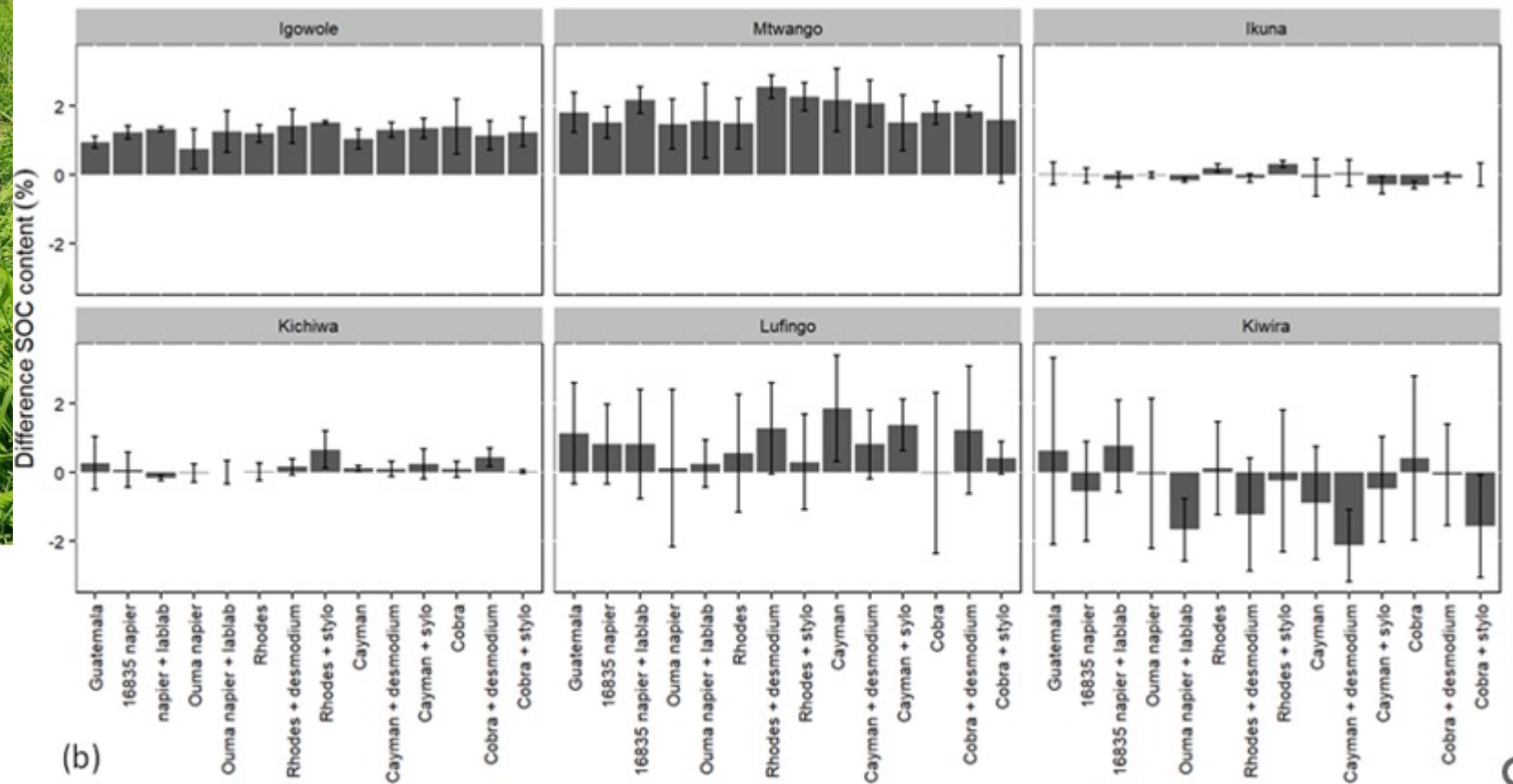
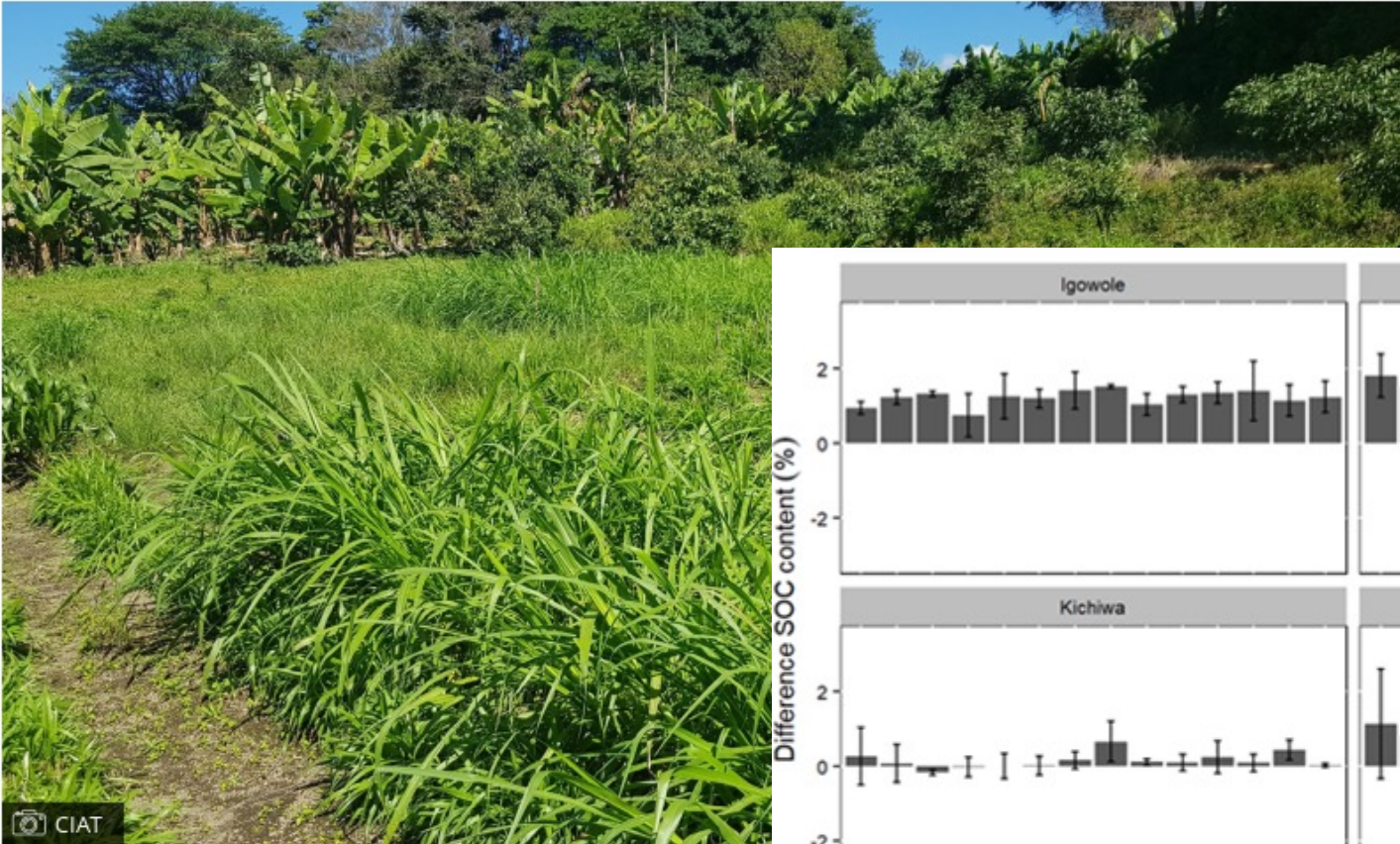


# Bacterial richness and diversity under different management systems

Richness	Bacteria richness	Fungi richness
<b>Long-term integrated soil fertility trial (INM3)</b>		
<b>+FYM</b>	322 <sup>a</sup>	235 <sup>a</sup>
<b>+FYM+MN</b>	284 <sup>b</sup>	210 <sup>ab</sup>
<b>-FYM</b>	241 <sup>c</sup>	220 <sup>a</sup>
<b>Undisturbed site</b>	302 <sup>ab</sup>	133 <sup>b</sup>
<b>Long-term conservation agriculture trial (CT1)</b>		
<b>CT+R</b>	249 <sup>b</sup>	205 <sup>a</sup>
<b>RT+R</b>	252 <sup>b</sup>	211 <sup>a</sup>
<b>Undisturbed site</b>	302 <sup>a</sup>	133 <sup>b</sup>

- High bacterial diversity in **+FYM** and **+FYM+MN**
- **+FYM & +FYM+MN**; high bacteria richness
- **-FYM**; low bacteria richness

# Soil carbon in perennial forages in Tanzania



# Where from here?

- Effectiveness of agroecological practices in improving soil health
- Long term experiment with deep-rooted forages
- Biophysical modelling





Alliance



# Thank you!

Sylvia Nyawira  
Scientist; MFL  
[s.nyawira@cgiar.org](mailto:s.nyawira@cgiar.org)

