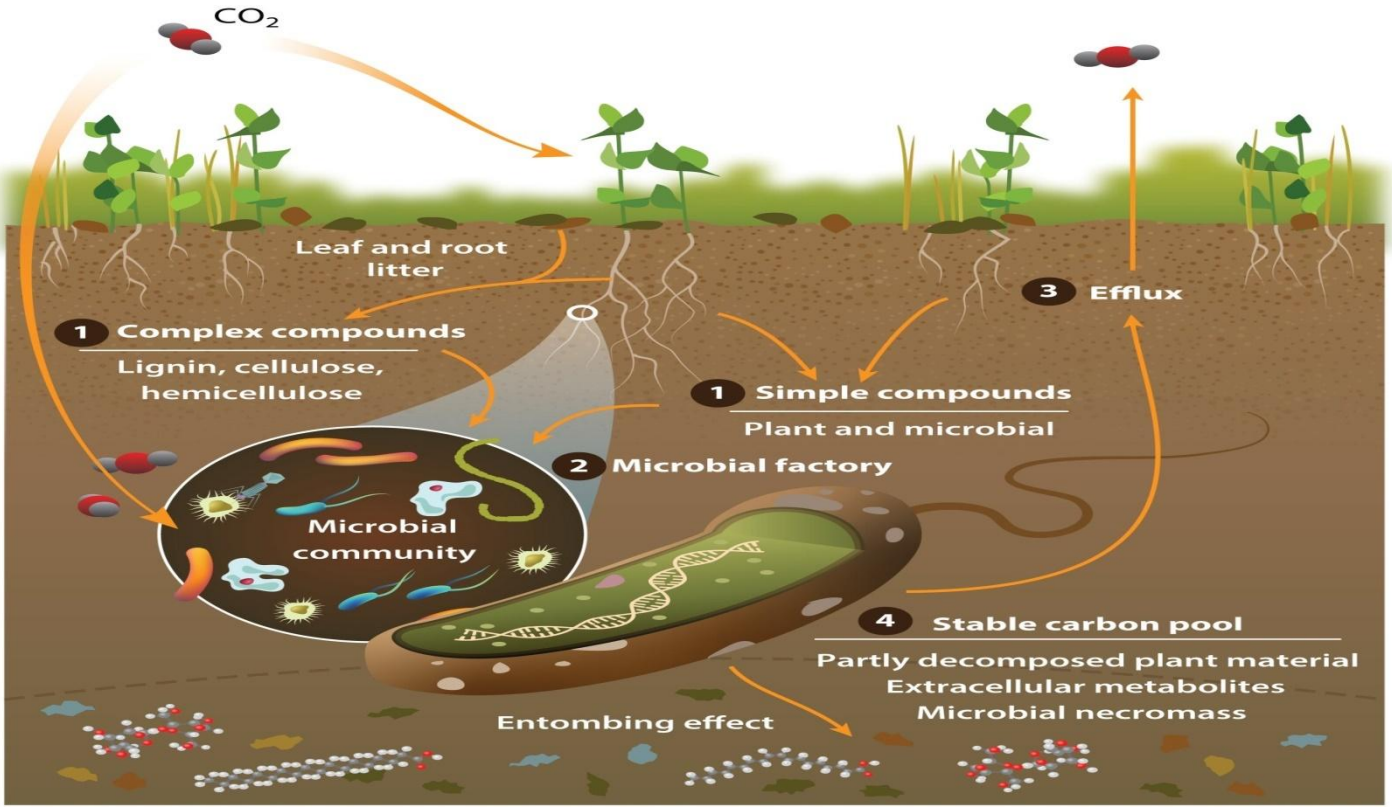
Carbon sequestration and footprints in conventional and conservation agriculture under maize-wheat sequence in coarse-textured soils of subtropical climate



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Introduction

Soil organic carbon (SOC) sequestration is integral for

i) Mitigating climate change

ii) Maintaining soil health and agricultural sustainability

Conventional agriculture often contributes to yield gains but there is a tradeoff with

1. SOC loss
2. High energy consumption and emission of greenhouse gasses (GHGs)

challenging

Soil health

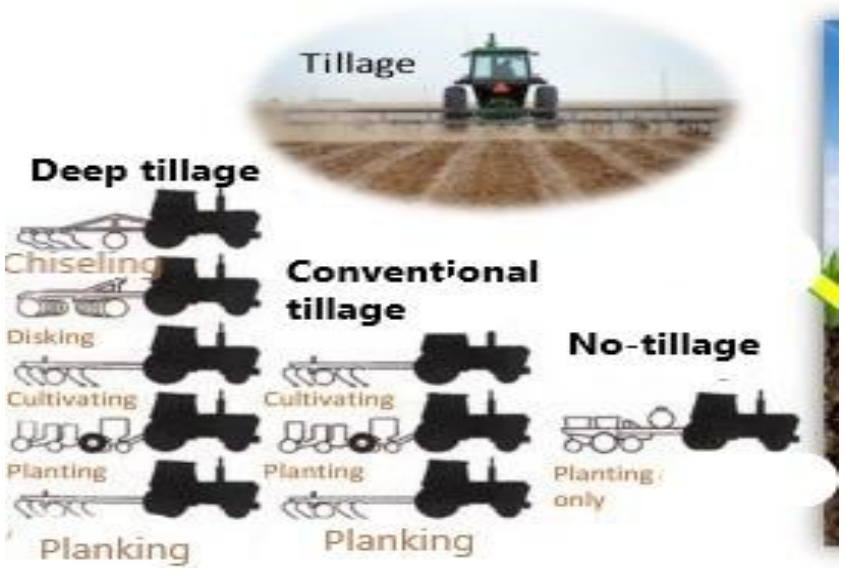
Agricultural and environmental sustainability

Methodology

1. **Carbon equivalent emissions**
2. **Greenhouse intensity**
3. **Soil organic C sequestration**
4. **Carbon efficient management in maize-wheat cropping system**
5. **Carbon footprints**

Split plot field experiment

Deep tillage		Conventional tillage		No-tillage	
M_0	M	M_0	M	M_0	M
$M_{0;}$ no-mulch M; rice straw mulch (6 t ha^{-1})					



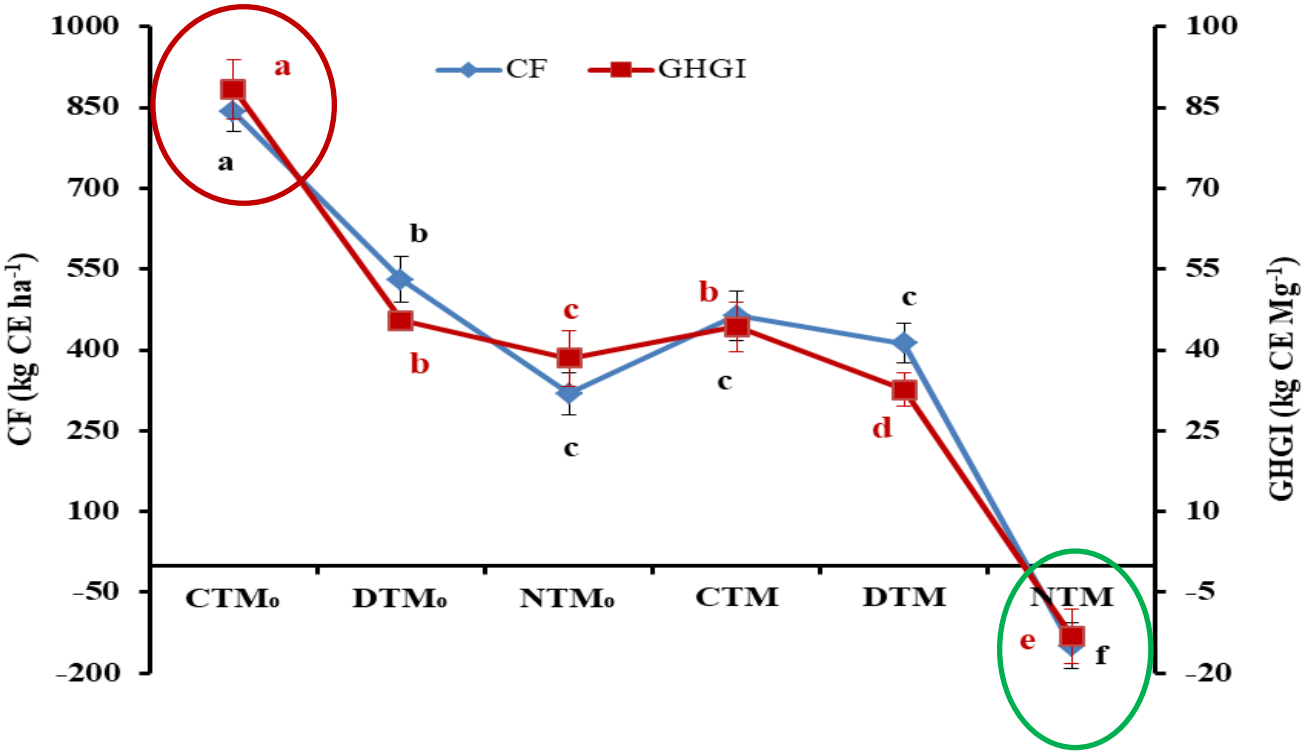
RESULTS

Carbon equivalent emissions (kg C ha^{-1}) reduced with decrease in tillage intensity

Operation	Maize	Wheat
Irrigation	320.7	481.1
Fertilizer	167.1	174.5
Tillage: CT	32.9	16.6
DT	81.7	16.6
NT	0.0	16.6
Seed	2.9	9.4
Sowing & Threshing	0	13.2
Pesticides	6.8	6.8
Mulch- M_0	0	0
M	81.9	0
Total for treatments		
CTM_0	530.4	701.6
DTM_0	579.2	
NTM_0	497.5	
CTM	612.3	
DTM	661.1	
NTM	579.4	

CTM_0, DTM_0 and NTM_0 are conventional, deep and no-tillage without mulch
CTM, DTM and NTM are conventional, deep and no-tillage with mulch

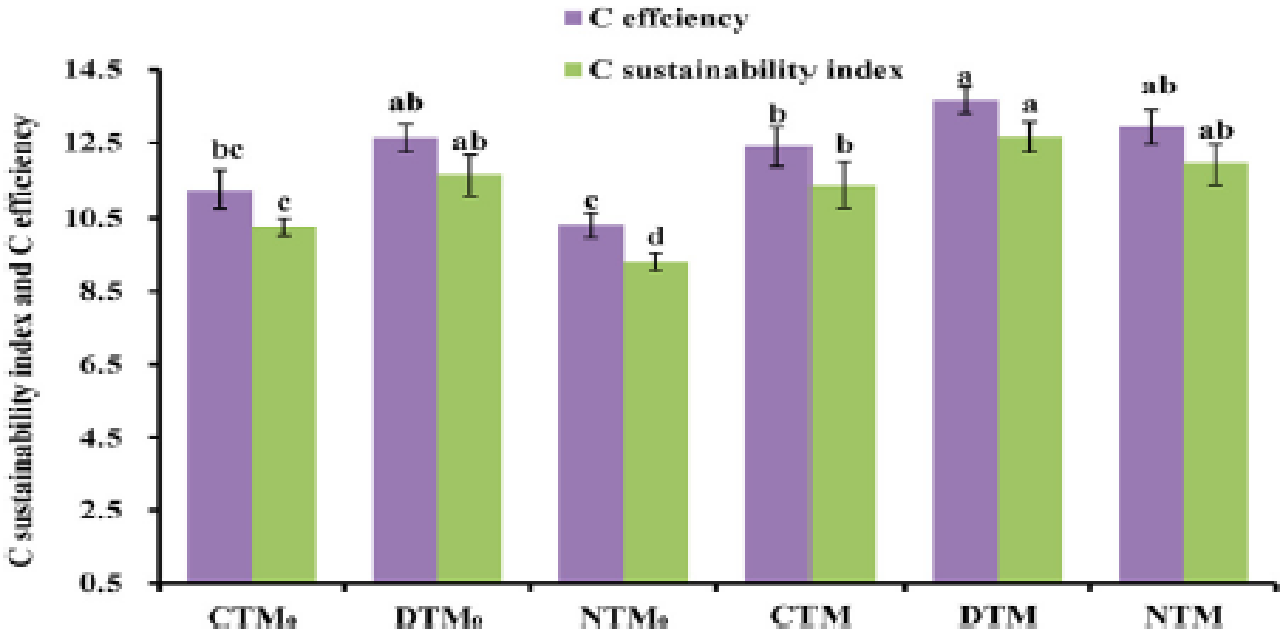
Conservation agriculture lowered carbon footprint and greenhouse intensity, lowest being in no-tillage with crop residue mulching



LSD (0.05)

CTM_0, DTM_0 and NTM_0 are conventional, deep and no-tillage without mulch
CTM, DTM and NTM are conventional, deep and no-tillage with mulch
CF; carbon footprint, GHGI; greenhouse intensity

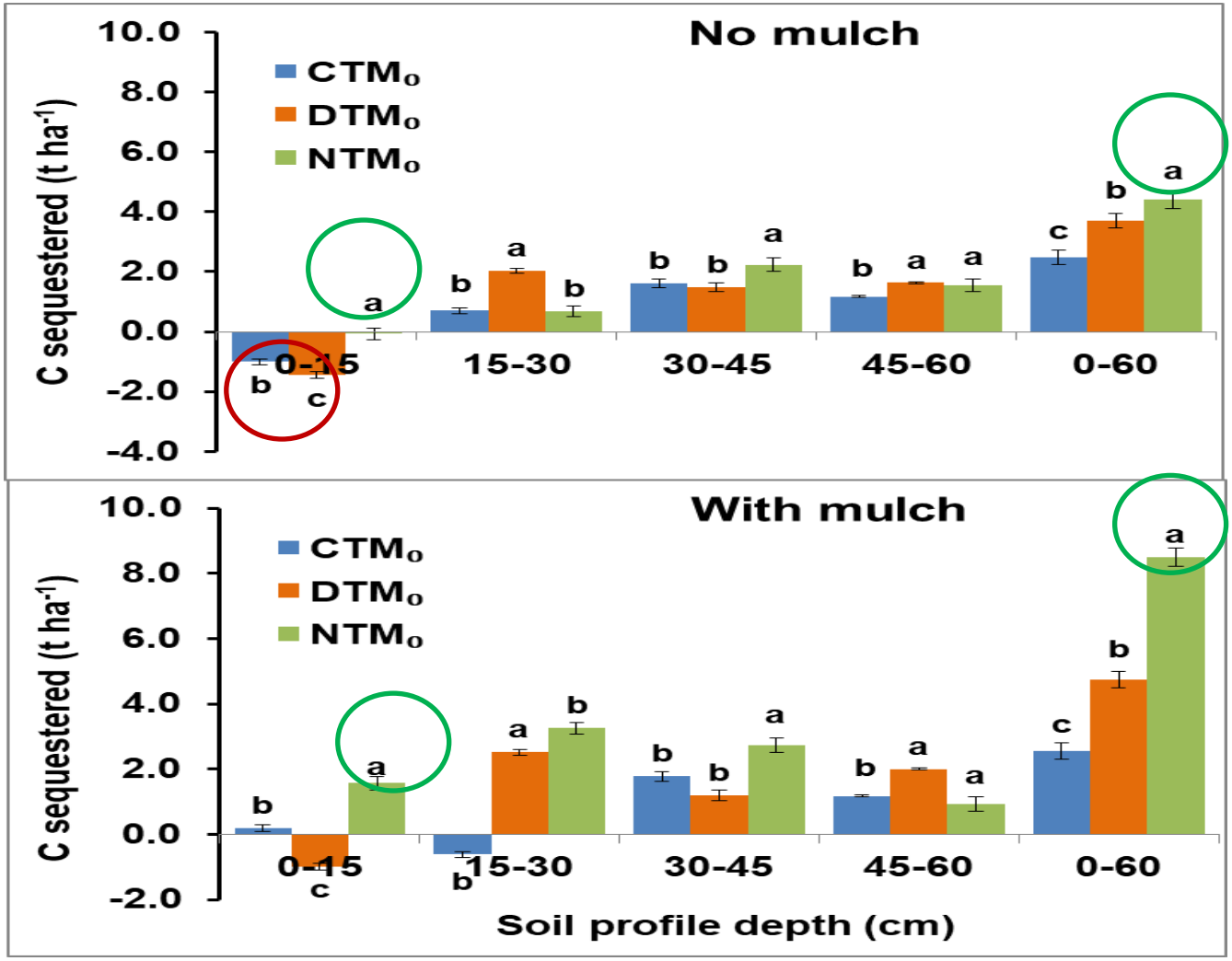
Conservation agriculture improved C efficiency and sustainability, highest being in no-tillage with crop residue mulching



LSD (0.05)

CTM_0, DTM_0 and NTM_0 are conventional, deep and no-tillage without mulch
CTM, DTM and NTM are conventional, deep and no-tillage with mulch

After 4 years, no-tillage with mulch resulted in greatest C sequestration



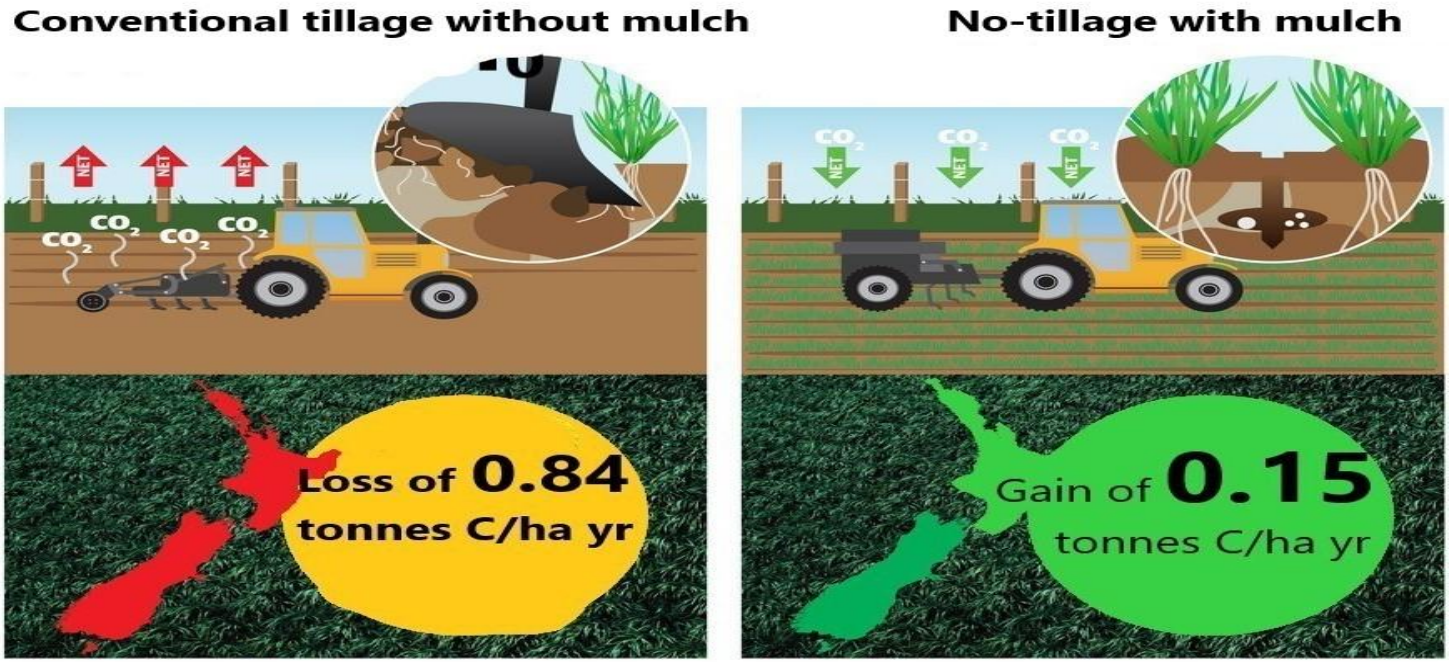
LSD (0.05)

CT, DT and NT are conventional, deep and no-tillage

Conclusions

No-tillage with residue mulching

- Proved to be C efficient practice
- Improved soil organic C sequestration
- Sequestered greatest soil organic C



THANK YOU