ACTAE

National Multi Stakeholder Workshop "Towards an Agroecology Transition"



Improving soil fertility, rice productivity and fodder resources in the lowlands rice of Cambodia: a complex trade-off

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Outlines

1. Briefs on rice production systems in Cambodia
2. Conservation Agriculture (CA) for lowland rice
3. Results of experiments and demonstration
4. Trade-off and challenges for dissemination

Briefs on rice production systems in Cambodia

Major rice agro-ecosystems

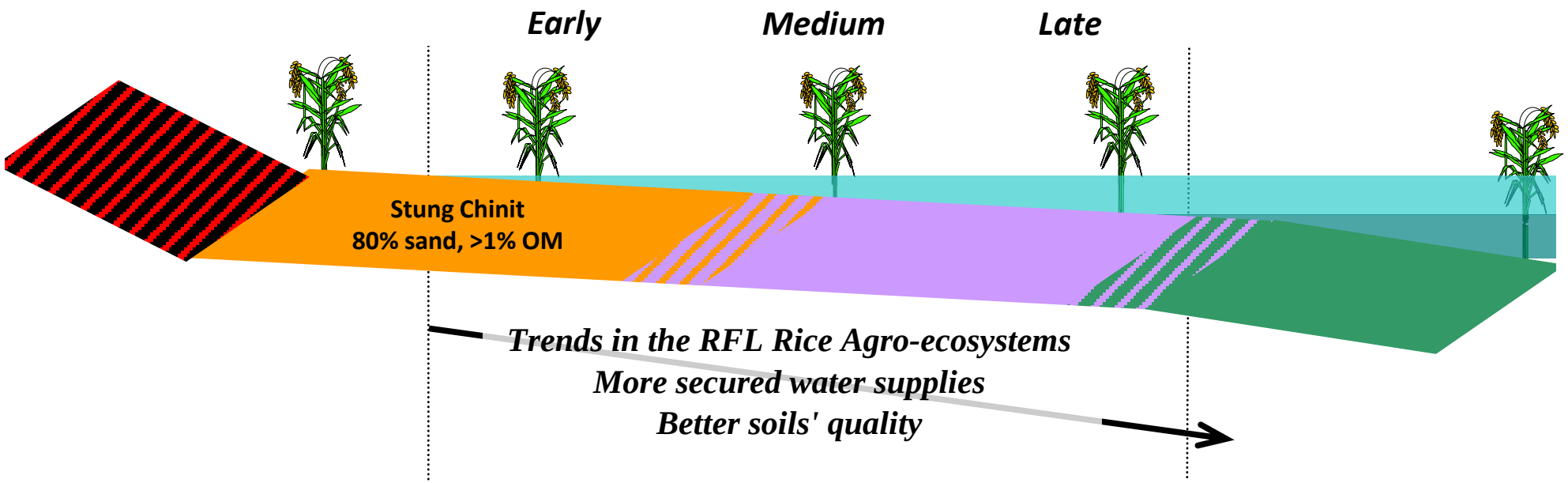
Total Cultivated Area of Rice ≈ 3 millions ha

Rainfed Upland
1.9%

Rainfed Lowland Rice
80.2%

Dry Season Rice
14.5%

Floating Rice
3.4%



Red & Black soils
Oxisol, Ultisol

Sandy Podzolic soils
Entisol, Ultisol, Alfisol

Hydromorphic plains
Ultisol, Alfisol, Vertisol

Flooded area
Entisol, Inceptisol

From Florent T., 2014

- Extensive rice-based system with increasing broadcasting and mechanization (combine harvester)
- Few diversification, low soil fertility and highly vulnerable
- Constant state of undernourishment for cattle and buffalo; rice stubble is often burned





CA for rain-fed lowland rice

Step I: broadcast cover crop Centro + Stylo in Nov (Phkar Rumdoul)

Centro + Stylo growing during dry season without irrigation

Step II: Roll down + Spray in May

No-till rice with residues covered in Jun.

Step III: No-till sowing 40kg/ha seed

Matrix experiment: main cropping patterns (CT and CA)

CT2/CA2: Early wet season rice / wet season rice + cover crops

CT3/CA3: Wet season rice / counter season rice

CT4/CA4: 1 wet season rice + cover crops c

December to June/July

Wet season: June/July - November

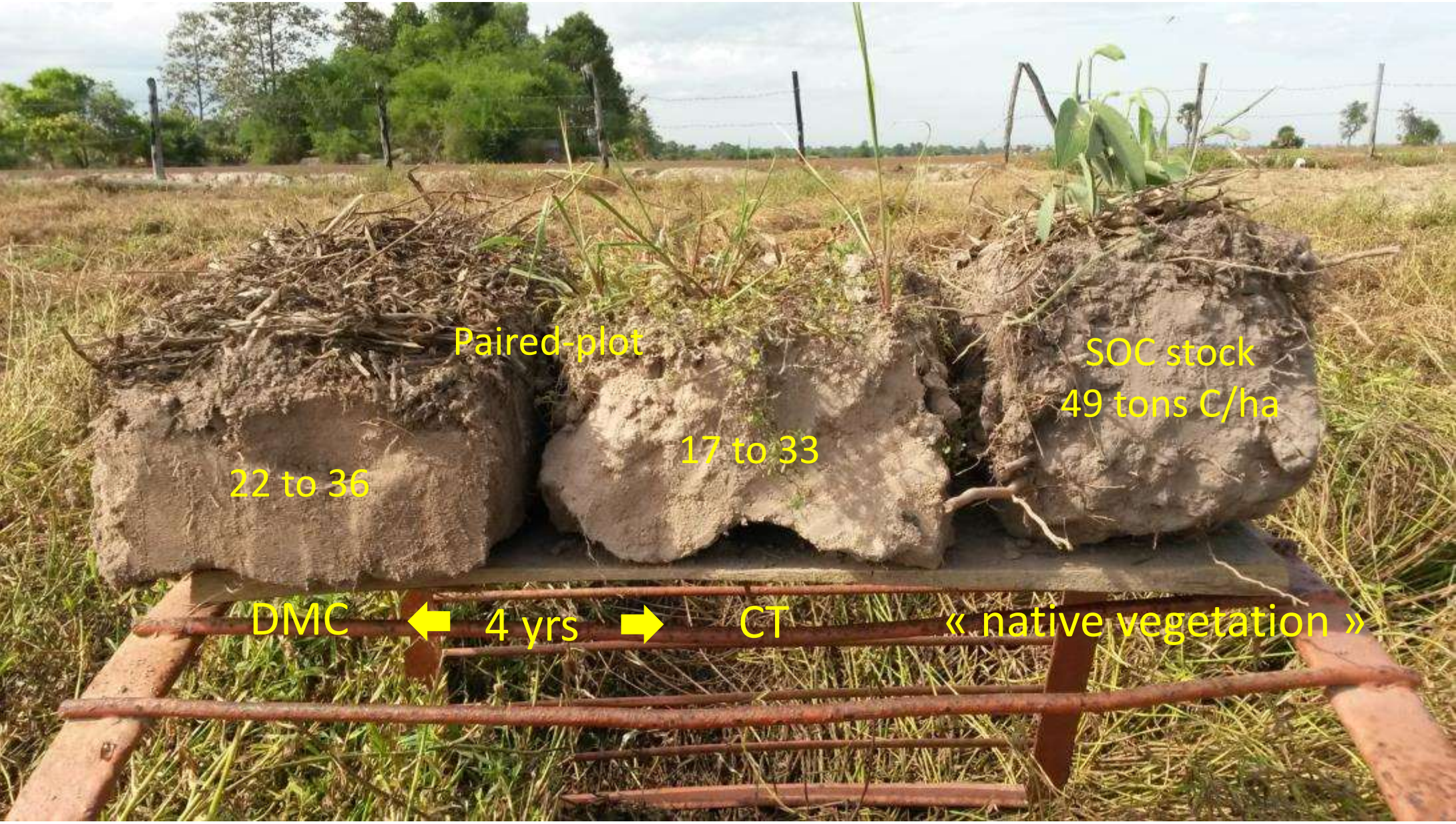
Decembe to May

2 rice + high C inputs

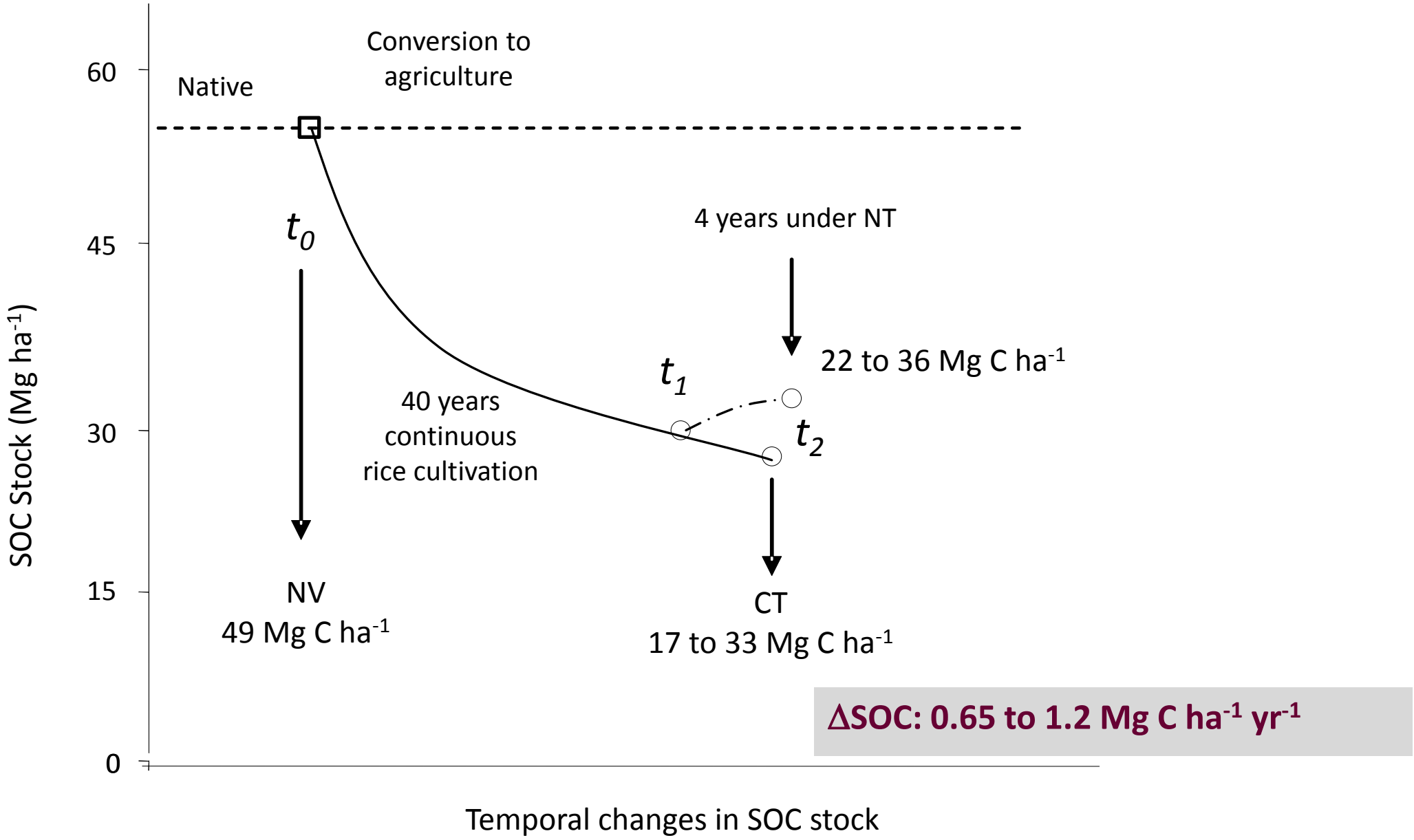
2 rice, no diversification

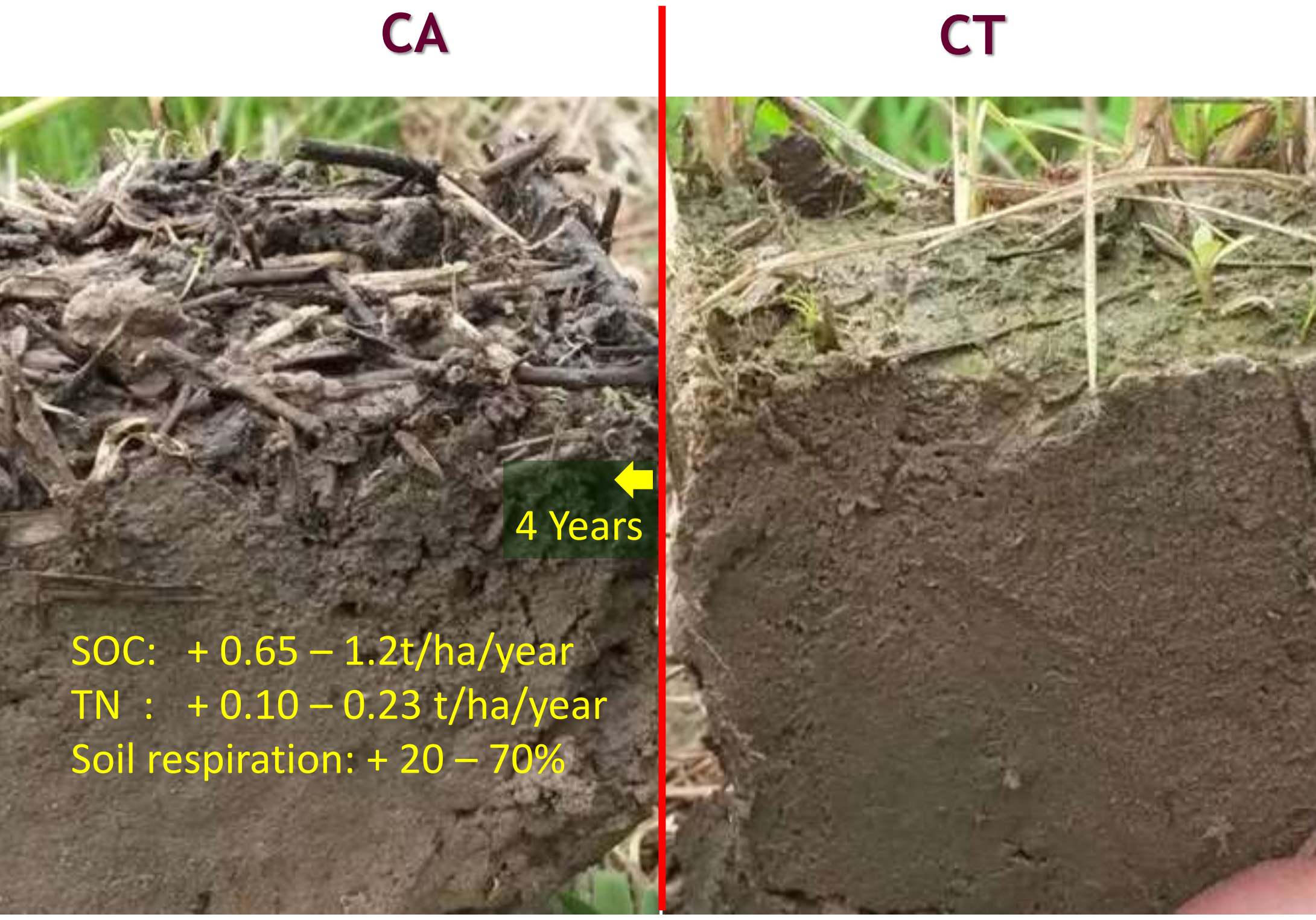
1 rice + high C inputs

Results: Temporal changes in SOC stocks (0-40 cm depth)



Leng et al. forthcoming. Tokyo University of Agriculture and Technology, GDA and CIRAD


SOC Stock (Mg ha-1)
60
45
30
15
0
Native
Conversion to agriculture
t0
4 years under NT
22 to 36 Mg C ha-1
t1
t2
40 years continuous rice cultivation
NV
49 Mg C ha-1
CT
17 to 33 Mg C ha-1
ΔSOC: 0.65 to 1.2 Mg C ha-1 yr-1
Temporal changes in SOC stock


CA
CT
4 Years
SOC: + 0.65 – 1.2t/ha/year
TN : + 0.10 – 0.23 t/ha/year
Soil respiration: + 20 – 70%

Productivity improvement

Pkha Rumdoul direct seeded on mulch of *S. guianensis* and *C. Pascuorum*

Fertilization : N:53-$P_2 0_5$:60-$K_2 0$:30 (150$/ha) + cover crops (32$/ha)

Trade-off: fodder and soil-yield improvement

Options:

Challenges for dissemination

- Medium-long term monitoring of soil fertility for the integration with livestock
- Green manure with conventional practice (plow + broadcast)
- Cover crops with CA technique: best management for soil and crop but, access to no-till planters remain a key constraint
- Collective decision is required to manage the grazing areas of rice stubble and fodders within the village/community


Iterative and adaptation process with smallholders


Thank you very much for attention!