A multicriteria assessment of early-implemented conservation agriculture cropping systems over farmers plots in northwestern Cambodia

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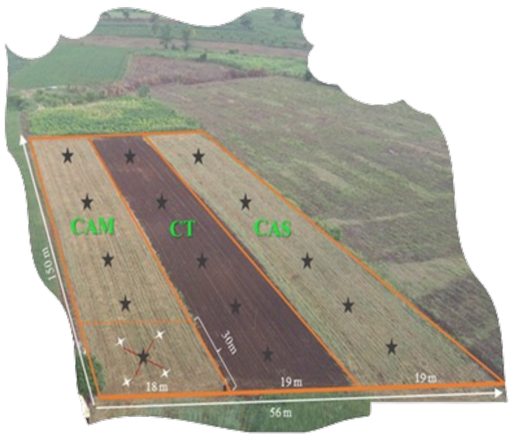
Background and objectives

Based on high market demands, upland farmers have gradually switched from rotational cropping systems that had shown their capacity to maintain soil fertility to intensive cash crops mono-cropping. Land conversion is associated with a marked depletion of soil fertility, erosion of lands and biodiversity and increasing use of chemical inputs that can gradually undermined the sustainability of the upland farming systems and the adaptation to climate change.

Objective of this study aimed to assessed the performance of CA compared with CT on maize production by a multi-criteria analysis which combined soil health and agro-economic performances.



ON-FARM DESIGN

Reaksmey Sangha village, Rattanak Mondul district, Battambang. 6 farmers plots (1 ha) randomly split into three treatments:

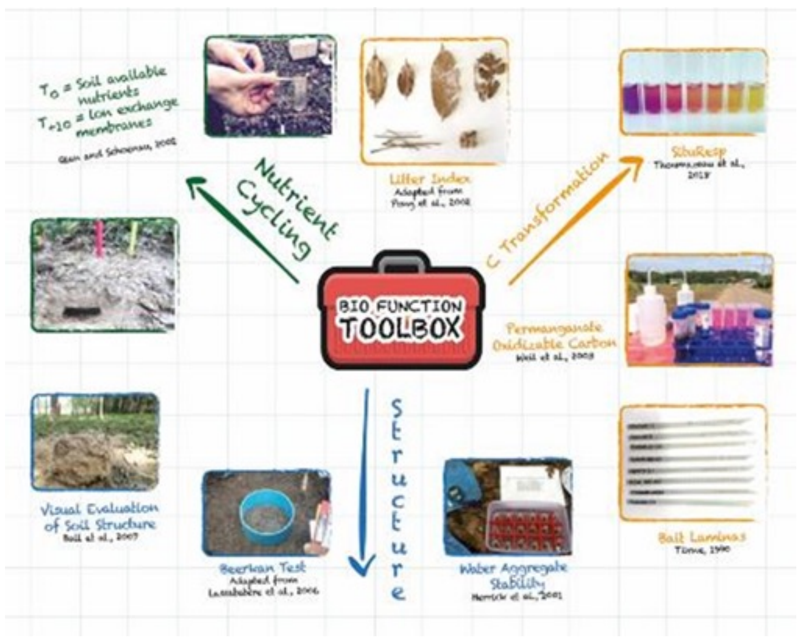
CT: maize monocropping under conventional tillage

CAS: maize under conservation agriculture with green sowing and using *Crotalaria juncea* (as cover crop)

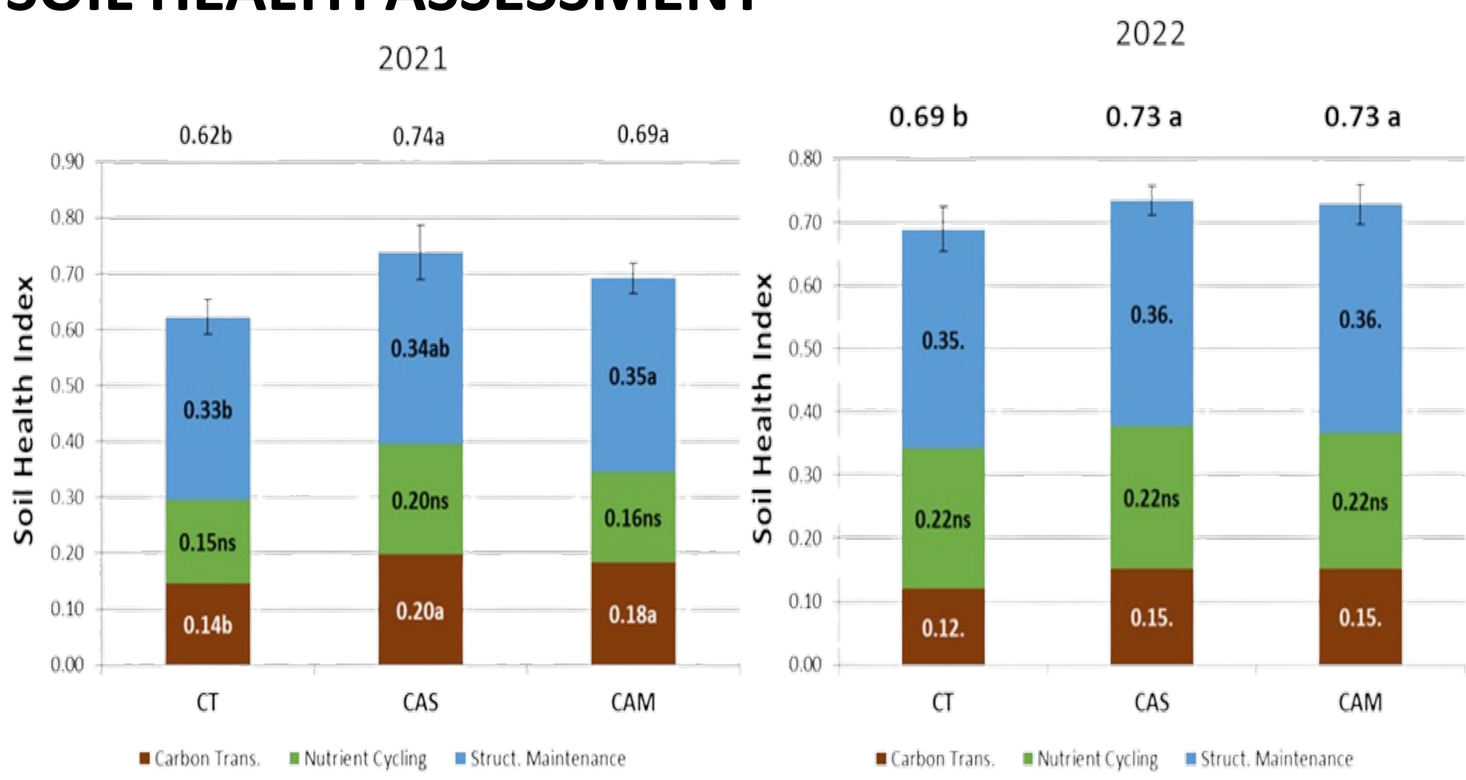
CAM: maize under conservation agriculture, green sowing, and with mix cover crops (*Crotalaria juncea* + *Pennisetum glaucum* L. + *Vigna unguiculata* L.).

Three main soil functions

- Soil carbon transformation
- Soil structure maintenance
- Nutrient cycling

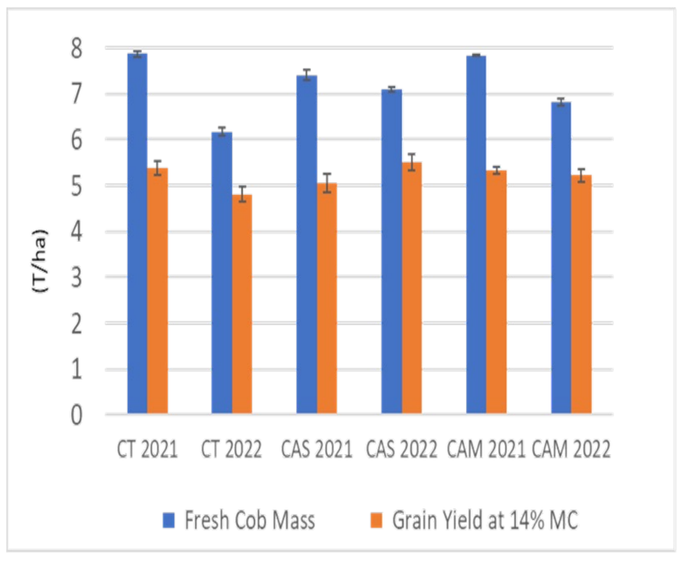


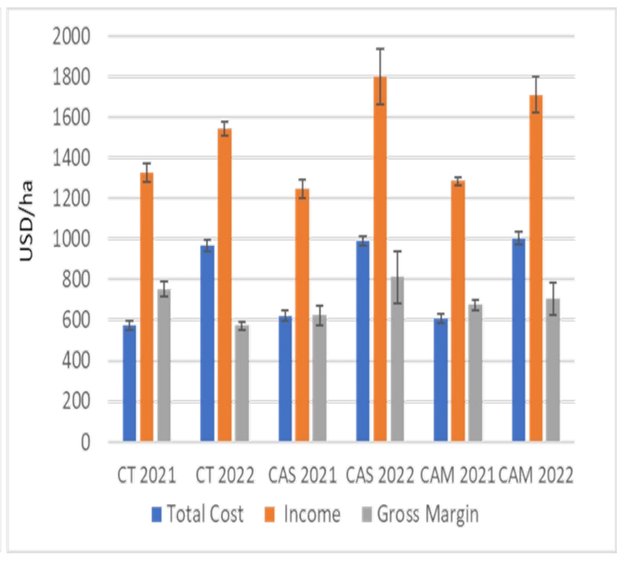
SOIL HEALTH ASSESSMENT



Soil Quality Index increased from +11% to +19% under CA systems when compared to CT (Pheap et al., to be submitted)

AGRO-ECONOMIC ASSESSMENT

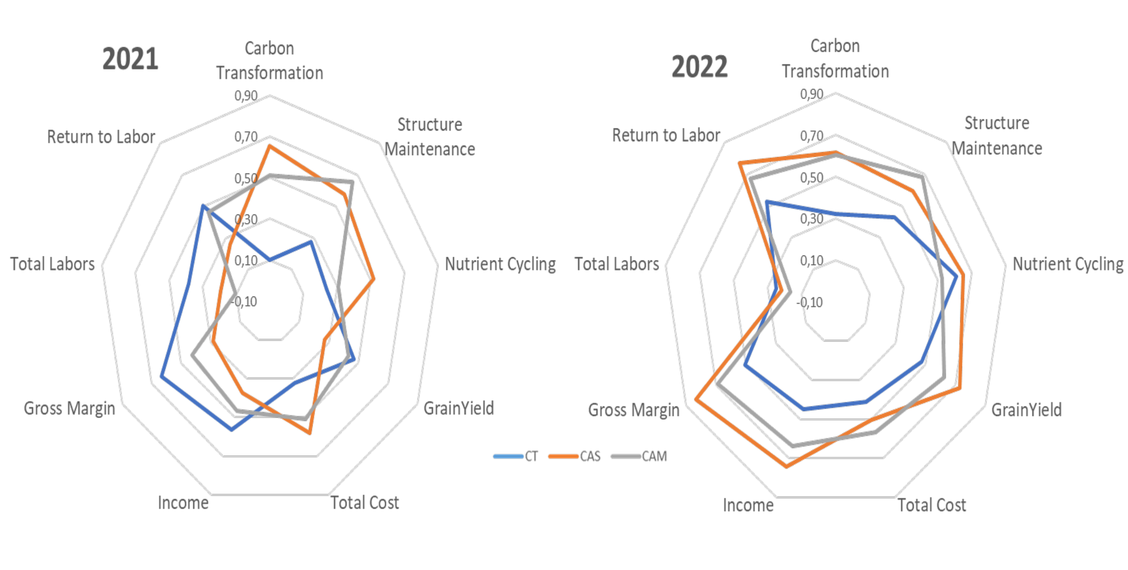




In 2021, no difference in yield was observed between the treatments (average of 7.6 t fresh cobs/ha and 5.3 t grains/ha). In 2022, 10% higher yield was recorded under CA systems (5.4 t/ha) when compared with CT (4.8 t/ha).

Across two cropping seasons, no significant in Total Cost, Income and Gross margin were recorded. In 2022, gross margin increased by 16% under CA systems while a decrease of 24% was recorded under CT when compared with 2021.

MULTI-CRITERIA ASSESSMENT



In 2021, better soil health indicators were observed under CA systems but with equal or lower agro-economic performances when compared with CT. In 2022, both soil health indicators and agro-economic performances were higher under CA systems.

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