

Soil Health Theory of Change: Pathways to AEI 2012-2018



Malian farmers evaluating options for agro-ecological intensification according to various criteria
Photo credit: Katrien Descheemaeker

West Africa Community of Practice



Project Partners

Wageningen University

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■ National Ag Research Center ■ University outside of Region
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Models to enhance farmer, researcher and policy-makers decision making

Multi-dimensional outcomes

Value heterogeneity: build on and enhance diversity

Modelling based on representative village of 99 households where currently 58% of the farms are **food self-sufficient** and **above the poverty line** shows projected scenarios with consecutively added conditions (each scenario builds on the previous) for the year 2020 with the following % non-poor and food self-sufficient: 26% if nothing changes; 39% with **intensification of livestock** production/ dairy; 75% with **policy for family planning** and off-farm work; 95% with **IPM**, small-scale **mechanisation** and **mineral fertilizer** on traditional cereals.

Incentivize, support & reinforce farmer participation to ensure responsiveness to farmers' needs, knowledge, problems, concerns & constraints

Contextualize and refine crop and landscape management options including

Connect to other institutions and initiatives

Participatory analysis with 37 farmers to develop opportunities for each farm type around legume-grain combos.

85 on-farm trial + trials carried out in neighboring villages through the Dryland Systems Collaborative Research Program (CRP DS) of the CGIAR (n=108)



2012-2014 results (n=132)
There was huge **variability among fields** in crop yields of unamended **control and treatment plots** partly explained by, soil type, previous crop, and weather variability



Reflective practice using the adaptive cycle

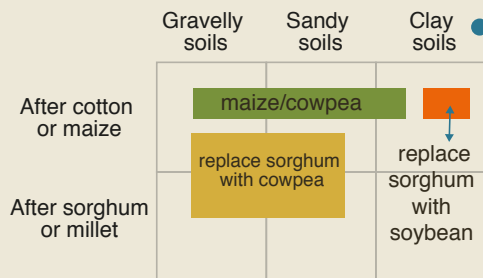
2014-2015: **farmer insights and statistical analysis** of trial results - better understanding of what options work for which contexts.

Frame needs, diagnosis, response, outcomes and scaling potential through options by context analysis

Farmers adapt options to their contexts

- **Maize/cowpea** intercropping combined with **stall feeding** increased HRE-LH and HRE farm gross margin by 20 and 26%
- Replacement of sorghum by **soyabean (or cowpea)** increased MRE and LRE farm gross margin by 29 and 9%

Generate farm typologies to better understand various agro-ecological and socio-economic contexts



Farm type	Input use intensity	Land use	Land Productivity
HRE-LH: High Resource Endowed with large herds	20 kg N/ha and 5 kg P/ha (financed with credit); larger herd, cart to move fertilizer	Cotton, maize, sorghum, millet, cattle	Similar to MRE
HRE: High Resource endowed	Same but with smaller herd	Same	Similar to MRE
MRE: Medium Resource endowed	Same	Same	Higher yields than LME due to residual fertilizer used on cotton and maize
LRE: Low Resource Endowed	7 kg N, 1 kg P/ ha; no livestock, no carts	Only 35% grow cotton	Low cotton production means little credit for fertilizer

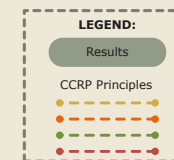
Traditional soil management systems based on shifting agriculture no longer viable due to land pressure

The **cotton zone** around Koutiala is characterized by **high population pressure**. Farmers rely on cotton and livestock for income and sorghum and millet as staple food crops. Income from cotton has been invested in cattle, leading to the **high livestock densities, which bring wealth but** also a vicious cycle of land degradation, leading to decreasing yields in recent years.

START HERE



A typology based on farm level resources was developed to classify farms using **cluster analysis** based on a 17-year monitoring period (1994-2010) of 30 farms.



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