Research to Impacts Map: **Soil Health**
Pathways to AEI project, 2012-2018

Malian farmers evaluating options for agro-ecological intensification according to various criteria

Summary: This project intends to produce tailored AEI solutions, knowledge, tools, approaches and communication products. To achieve its objectives and outcomes, the project will use a farming systems analysis (FSA) approach, gradually scaling up to a food systems approach through local value chains and attention for nutrition-related activities. The research is embedded in stakeholder-researcher exchange networks, for which communication tools and approaches will be refined.

For more information see:
www.ccrp.org/grants/pathways-to-aei-ii/

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West Africa
Community of Practice

Mali

Project Partners

Wageningen University
ICRISAT
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■ University outside of Region   ■ Non-Governmental Organization
■ International Ag Research Center   ■ National Ag Research Center

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.

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

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

Contextualize and refine crop and landscape management options including

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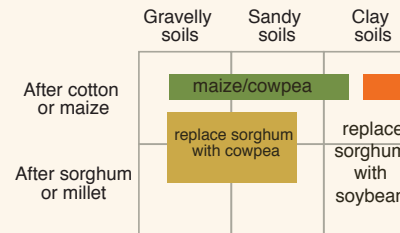
2014–2015: **farmer insights and statistical analysis** of trial results – better understanding of what options work for which contexts.

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%

	Gravelly soils	Sandy soils	Clay soils
After cotton or maize		maize/cowpea / replace sorghum with cowpea	/ replace sorghum with soybean
After sorghum or millet			

Models to enhance farmer, researcher and policy-makers decision making

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.