Co-learning Through Agronomic Experiments with Farmers: Tailoring Agroecological Intensification to the Context of Southern Mali

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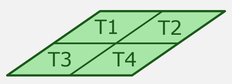
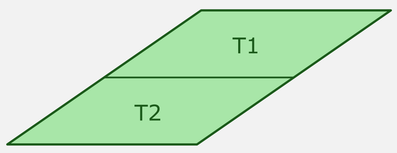
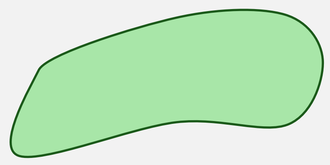
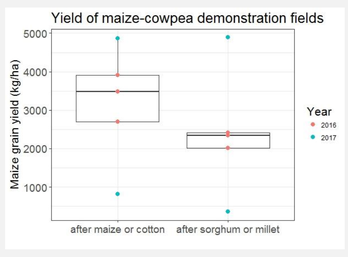
	ON-FARM TRIAL	DEMONSTRATION FIELD	FARMERS' TRY-OUT
		Promising options 	Farmer adaptation 
Objective	**Test new AEI options at plot level**	**Demonstrate and co-evaluate promising options on a larger scale (0.25 ha)**	**Follow-up of crop management practices to assess farmers' adaptations of options**
Design	Research based on farmers' ideas	Research	Farmer
Inputs	Research provides	Research provides	Farmer
Analysis	Research and farmers	Research and farmers	Research and farmers

Example option: Maize-cowpea intercrop

Planning and feedback discussion



Maize grain yield of fields in and out of the defined niche

Criteria	Score by farmer		
	Positive	Neutral	Negative
Grain yield	0.53	0.40	0.07
Stover yield	0.67	0.33	0.00
Labour requirement	0.53	0.40	0.07
Insect infestation	0.40	0.40	0.20
Resistance to drought	0.33	0.53	0.13
Effect on soil	0.93	0.07	0.00
Cost of inputs	0.27	0.53	0.20
Access to inputs	0.53	0.47	0.00
Cycle of the crops	0.67	0.33	0.00

Proportion of farmers scoring their field pos, neutral or neg

Time	2012-2015	2016-2017	2017-2018 (ongoing)
Treatments	• Cowpea grain and fodder variety • Additive and substitutive intercropping pattern	• Sowing after cotton or maize, compared to after millet or sorghum • Comparing additive intercropping patterns	Farmers implement various additive patterns and cowpea varieties
Results	• Better maize grain yield with additive pattern • Better maize grain yield with cowpea grain variety, yet less cowpea fodder [3]	No significant difference between different additive patterns	Farmers assess their fields positively Possible constraints: cost of inputs, insect manifestation, drought
Niche	When previous crop is cotton or maize, there is no maize grain penalty when intercropping in additive pattern [3]	Confirmation of niche: higher maize grain yield after cotton or maize *(P=0.045)*	Fields are not specifically targeted to the niche (6/15 fields after cotton or maize)

Background

Agroecological intensification (AEI) could contribute to increase productivity in Southern Mali, where yields are stagnating and population is growing. Uptake of promising options by farmers is not guided by profitability alone but also by perceived risks, embedding in value chains or labour shortages.

Objective

Co-learning between farmers and research, from design to uptake of options, contributes to a better understanding and tailoring of possible steps towards AEI. We present here

- Expansion of an existing co-learning methodology with trials at different levels to better understand farmers' perception/adoption of options
- An example of the learning outcome for maize-cowpea intercropping

Some AEI principles guiding on-farm trials

- Crop diversity with emphasis on legumes
- Efficient use of resources
- Equitable improvement of livelihoods
- Economic, environmental and social sustainability

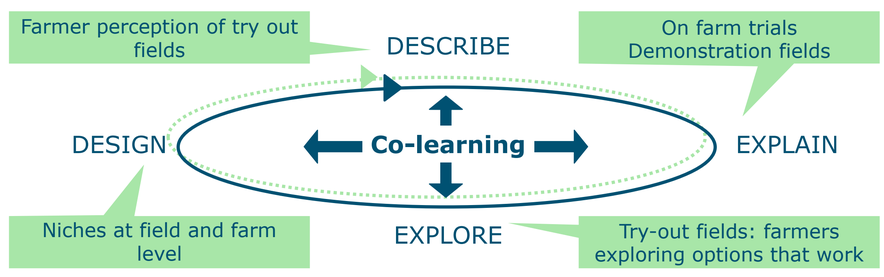
Right: Farmers evaluating a sorghum demonstration field

Methods

Participatory on-farm trials are set up as part of annual DEED cycles (Describe, Explain, Explore, Design) [1], aiming to offer a basket of options from which farmers can choose the technologies that fit their farm context. Both design and results of trials are discussed with a farmer research network [2].

A first series of consecutive DEED cycles, based on small plot trials, resulted in the demarcation of niches wherein certain options are promising [3]. The approach is now enriched by adding two types of trials in a second phase of DEED cycles: field-level demonstrations and farmer try-out fields.

DEED cycle



Results

We focus here on the ongoing co-learning cycle with respect to maize-cowpea intercropping. Demonstration fields confirmed the niche defined by on-farm plot trials. Farmers try-out fields suggest farmers apply the technology recommendation but do not always target it to the defined niche. The possible constraints mentioned are the cost of inputs, insect manifestation and drought.

Conclusions

Multi-year adaptive DEED cycles with trials at different scales provided deep insights in farmers' use of technology and perceived constraints. The research will continue to collect information for tailoring the basket of options at field and farm level.

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[1] Descheemaeker et al. 2016. Experimental Agriculture: 1-22.
[2] Nelson et al. 2016. Experimental Agriculture: 1-20
[3] Falconnier et al. 2016. Field Crops Research 187(Supplement C): 113-126.