Incentivizing the adoption of integrated soil fertility management in smallholder farming systems in northern Ghana

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Introduction

- Soil fertility is severely degraded in northern Ghana and continues to worsen due to unsustainable land use and management practices.
- Integrated Soil Fertility Management (ISFM) offers a sustainable approach to mitigating the decline in soil fertility and agricultural productivity (Vanlauwe et al., 2010).

→ The study explored existing ISFM practices and conducted a cost-benefit analysis between conventional farming and ISFM. Incentive mechanisms used to promote ISFM adoption were also investigated.

Methods

- Smallholder farmers from the Tanchara and Kalsagre communities in the Lawra District of the Upper West Region, Ghana, were surveyed.
- Using quota sampling, 106 smallholder farmers cultivating cereals and legumes (maize, sorghum, groundnut) were selected. The sample comprises both those exposed to ISFM who adopted its practices and those who, despite exposure, did not.
- Data on the combinations of ISFM practices and the costs (e.g., materials, labour, transportation) and benefits (e.g., yield, diversified revenue streams) of adoption were collected from practitioners and net benefit calculated.
- Additionally, field observations were carried out.

Results

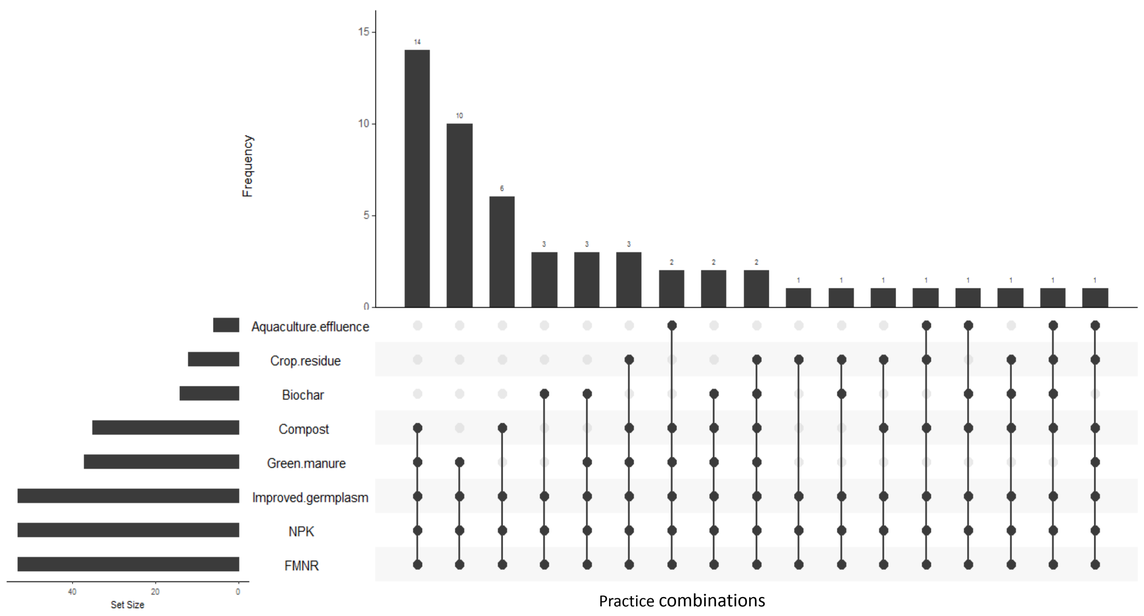

Figure 1: Combinations of ISFM practices implemented by farmers in the study communities

- The majority of farmers implement a combination of germplasm and fertilizer (NPK).
- Farmer-managed natural regeneration (FMNR) is a key component of ISFM in the study communities due to the arid nature of the region.
- Nitrogen-fixing trees (e.g., *Faidherbia albida*) are nurtured. Species such as *Vitellaria paradoxa* (shea tree) and *Parkia biglobosa* (dawadawa) are also nurtured to supplement food and income, particularly during the lean season.

Conclusions

- Farmers adopt various ISFM combinations, with only a few implementing complete ISFM (germplasm & fertilizer + organic resource management + local adaptation).
- Farmers need continuous education and technical support to properly apply ISFM and unlock its full potential. For example, rather than broadcasting fertilizer, farmers could be trained and supported to apply fertilizers through banding or microdosing techniques.
- The FMNR technique is central to the implementation of ISFM in the study area, as it provides both monetary and non-monetary benefits.
- Market access, model farms, social networks, additional income from tree components and dry season agriculture are key incentives for ISFM adoption in the study communities.

Results

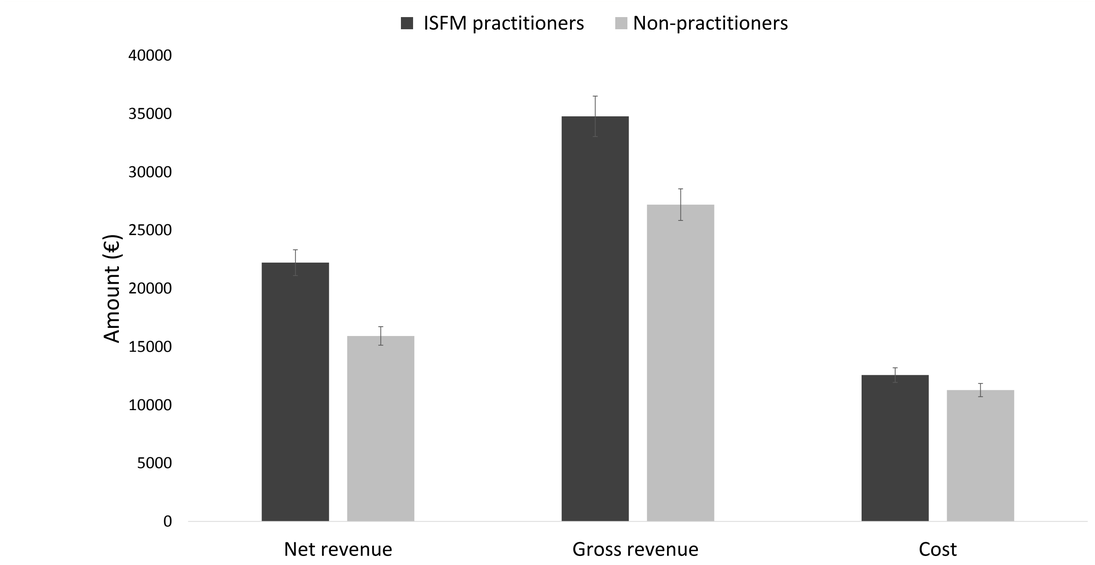

Figure 2: Cost and revenue comparison between ISFM practitioners and non-practitioners.

- ISFM enhances the revenue of practitioners.
- Supportive network among practitioners during ISFM implementation account for the lower variability in cost values observed for both practitioners and non-practitioners.

Figure 3: Model farm with an overhead irrigation tank in the Tanchara community, where women cultivate vegetables for sale during the dry season.

- ❑ Farmers are incentivized to adopt ISFM through initiatives such as market linkages, community conservation sites, social networks and a model farm equipped with an overhead water tank.
- ❑ Women practitioners cultivate vegetables on the model farm during the dry season.

Figure 4: A dug hole near a farmstead for compost preparation.

Figure 5: Naturally regenerating trees under management on farmland. Farmers are trained to implement thinning and pruning techniques as the trees mature.

Reference

Vanlauwe, B., Bationo, A., Chianu, J., Giller, K.E., Merckx, R., Mokwunye, U., Ohiokpehai, O., Pypers, P., Tabo, R., Shepherd, K.D. and Smaling, E.M.A., 2010. Integrated soil fertility management: operational definition and consequences for implementation and dissemination. *Outlook on agriculture*, *39*(1), pp.17-24.