



## **Hans H. Ruthenberg-Graduierten-Förderpreis 2017/**

## **Hans H. Ruthenberg Award for Graduates 2017**

Sarah Luisa Senz “Adoption of Agro-Ecological Farming Practices. A Case Study from Burkina Faso”

University of Hohenheim, 2016

Supervisor: Prof. Dr. Regina Birner

### **Summary**

Sorghum (*Sorghum bicolor* (L.) Moench) and pearl millet (*Pennisetum glaucum* L.) are the main staple foods for the Burkinabe population. Due to degradation of soils, climate change and widespread striga (*Striga hermonthica* (Del.) Benth.) infestation, yields in sorghum- and millet-based farming systems are declining dramatically with few alternatives available. In response, the project "Farmer led agro-ecological intensification in Burkina Faso" was established by the NGO Groundswell International. in cooperation with local partners. The aim of the project is to promote innovative and context-adapted agro-ecological farming practices like Zai: pits, half-moon pits, stone contour bunds, micro-dosing of non-organic fertilizer, compost production and application, crop rotation, intercropping, Assisted Natural Regeneration and the use of new improved varieties. Such practices are expected to address urgent problems of smallholder agriculture and promote more sustainable farming systems in the Sahel region. Farmer-to-farmer training has been the main method for disseminating these practices.

When the project reached its third year of implementation, an assessment of project activities and the respective techniques was conducted. A better understanding of the diffusion of sustainable land management practices in dryland smallholder farming systems is an urgent matter as they can serve as the foundation to improve crop yields and farmers' livelihoods in an ecologically sound and socially acceptable way. This project is well-suited to serve as a case study from which more general insights on the diffusion of agro-ecological farming approaches can be drawn.

This study used a mixed-methods approach consisting of focus group discussions and a household survey to provide a socio-economic assessment of the adoption process among small-scale farmers in the project villages. Factors affecting adoption, challenges related to it, impacts of adoption for farmers and their households, as well as the influence of the project itself were the main focus of the assessment.

The focus group discussions were analyzed qualitatively, while survey data were analyzed using descriptive analysis and logit regression. In addition, a poverty index was created using

principal component analysis in order to analyze the influence of a household's poverty status on the adoption rates for different techniques and to assess the reach of the training concept.

The results of the study suggest that the dissemination of agro-ecological farming practices holds enormous potential to enhance small-scale farm households' food security. Farmers expressed their overall satisfaction with the project and project training was found to significantly encourage the adoption of most practices. Most farmers could increase their number of meals per day, shorten the lean season and they perceived the quality of food as having improved compared to before the project started. Trained farmers were more successful in improving these three parameters than non-trained farmers.

Farmer-to-farmer training was found to especially support the poorest households and to encourage female farmers. It can therefore help address both food insecurity and socio-economic inequalities. It is a motivating concept for farmer trainers and students that comes with a variety of advantages including cost-effectiveness and local ownership of innovations.

Despite these positive outcomes, a variety of challenges related to adoption faced by farmers was encountered. Difficulties in transportation and the lack of easily accessible water throughout the year were the main challenges highlighted by farmers. These two points are important pre-requisites for a variety of agro-ecological techniques, especially those that are linked to the use of compost or stones like stone bunds and Zaï.

The restricted amount and late availability of subsidized fertilizer limits fertilizer use; the national subsidy system is not oriented towards the staple crops that are most important for the poorest farmers. Improved seeds are often only used when given to farmers for free and otherwise not purchased. Due to limited opportunities, as well as poor management skills, few farmers have accessed credit in order to buy inputs.

Assisted Natural Regeneration is limited by laws that do not recognize naturally germinated trees as part of the agricultural production system. Consequently, farmers see high risks of forest agents making them pay fees or penalties when implementing the technique.

Women continue to face many obstacles, including limited access to land, working equipment and other assets. Their social status as well as the enormous workload they traditionally bear in the household, with limited decision-making power, still limit female farmers' adoption of improved farming practices. Though project activities could not eliminate existing gender imbalances, they helped embolden women, strengthened their social positions and provided various opportunities for women.

Overall, it became clear that farmers' selection of suitable technologies is more complex than considering merely technical performance. Wider scale constraints and trade-offs exist on different levels. It is imperative to scale up the project's strengths and address the weaknesses identified in this study. Several implications and recommendations both for future project activities as well as national policies can be drawn.

Gender issues have to be tackled. This could be done through an increase in female farmer trainers to 50 % wherever possible and the provision of equipment specifically to female farmers' organizations. Incentives for the participation of women should be offered and a special focus should be put on women's possibilities to acquire their own livestock.

Current project activities need to be complemented through training and accompaniment of

seed producers in the villages to provide sufficient, low-cost and timely access to improved varieties continuously. Training on business/management skills are needed to enable rational investment and sales decisions. Farmers' organizational capacity should be further strengthened, the introduction or expansion of warrantage systems (inventory credit systems) being especially important.

In order to assure good quality of training, own experimentation among farmers and forums for exchange should be fostered further. Sufficient follow-up training and personnel for inquiries must be available to farmer trainers, village committee members and others. An organizational structure (e.g., a village committee) that can self-manage farmer-to-farmer training is vital to fulfil a variety of tasks. For sustainable progress, hubs that promote innovation and experimentation on farming techniques are essential.

Efficient transportation and water infrastructure are prerequisites for successful implementation of agro-ecological farming practices. At the same time, the national subsidy program needs to be adapted to the poorest farmer's needs. A more efficient distribution system, the inclusion of credit schemes and an extension of the fertilizer subsidy program to other crops are crucial.

From the insights gained through this study, important lessons can be learned for the diffusion of sustainable land management practices. This thesis showed that obstacles for adoption of innovative farming techniques are not only related to economic efficiency, but are rather a complex interplay of technical, legal, social, infrastructural and financial aspects. The analysis at the household- and at plot-level indicates the relevance of an innovation's fit into the farming system. Trade-offs can never be fully avoided and farmers' different ways to deal with them should be admitted without undermining the innovation's value. At the heart of a dynamic dissemination process is the active acquiring, adapting and further developing of beneficial ideas, not constrained by given application methods. Moreover, strengthening farmers' organizational capacity, targeted support for women, an improved infrastructure network and a conducive policy environment are the most important steps towards promoting the diffusion of sustainable land management systems.