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## Agricultural Innovations in Cropping Systems of Semi-Arid Southwestern Madagascar under Multiple Ecological and Socio-Economic Constraints

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### Abstract

In the Mahafaly region, agriculture is constrained by low and erratic precipitation, by low soil organic matter and nutrient contents. Farmers cultivate cassava, maize, sweet potato, millet and legumes with hand tools, neither using plant protection agents nor chemical or natural soil amendments. Even though subsistence production is dominant, farmers are integrated into local market systems. To develop sustainable land use strategies that reduce pressure on remaining biological diversity, we seek to identify and promote promising agricultural innovations. Field trials are accompanied by social science surveys addressing knowledge and attitudes of local farmers towards agricultural innovations (ex ante survey: n=145 in 4 trial villages, n=123 in 3 control villages). An *ex post* survey will monitor changes in innovation attitudes.

On-farm experiments and demonstration trials include the application of manure up to 30 t ha<sup>-1</sup> in cultivation of introduced drought-tolerant maize as well as sorghum and millet varieties. Using a participative approach with seed donations, we test the feasibility of irrigated vegetable cultivation in house gardens. First results indicate that maize and sorghum emergence is better on manured plots under low rainfall conditions, and that yields may more than double. The participative vegetable cultivation with local women resulted in first successful production, and will be supplemented by a controlled field trial with manure and charcoal application as well as shading in the following season.

Survey results highlight that farmers had an extremely risk averse attitude towards innovations including manure application before the start of the trials. The wide-spread adoption of manure application may be hindered by lack of transport options. On the other hand, farmers involved in the “trials” experienced successful harvest this year, and we see increasing interest of additional farmers to participate.

Our study is embedded into a “markets for the poor” (M4P) approach, which regards agricultural production as depending on market-facilitated availability of inputs and of commercialisation options independent of donor support. To this aim, farmers are asked to pay for commercially sourced vegetable seeds in the next round of on-farm trials. Likewise, we started to explore options for small-scale, “entrepreneurial” seed multiplication of the drought-resistant maize variety.

**Keywords:** Drought-tolerance, input intensification, participatory experiments, sub-Saharan Africa