

Tittonell P., A. Muriuki, K.D. Shepherd, D. Mugendi, K.C. Kaizzi, **J. Okeyo**, L. Verchot, R. Coe, B. Vanlauwe (2010). The diversity of rural livelihoods and their influence on soil fertility in agricultural systems of East Africa – A typology of smallholder farms. *Agricultural Systems Journal* 103: 83–97.

## ABSTRACT

Technological interventions to address the problem of poor productivity of smallholder agricultural systems must be designed to target socially diverse and spatially heterogeneous farms and farming systems. This paper proposes a categorisation of household diversity based on a functional typology of livelihood strategies, and analyses the influence of such diversity on current soil fertility status and spatial variability on a sample of 250 randomly selected farms from six districts of Kenya and Uganda. In spite of the agro-ecological and socio-economic diversity observed across the region (e.g. 4 months year<sup>-1</sup> of food self-sufficiency in Vihiga, Kenya vs. 10 in Tororo, Uganda) consistent patterns of variability were also observed. For example, all the households with less than 3 months year<sup>-1</sup> of food self-sufficiency had a land:labour ratio (LLR) < 1, and all those with LLR > 1 produced enough food to cover their diet for at least 5 months. Households with LLR < 1 were also those who generated more than 50% of their total income outside the farm. Dependence on off/non-farm income was one of the main factors associated with household diversity. Based on indicators of resource endowment and income strategies and using principal component analysis, farmers' rankings and cluster analysis the 250 households surveyed were grouped into five farm types: (1) Farms that rely mainly on permanent off-farm employment (from 10 to 28% of the farmers interviewed, according to site); (2) larger, wealthier farms growing cash crops (8–20%); (3) medium resource endowment, food self-sufficient farms (20–38%); (4) medium to low resource endowment relying partly on non-farm activities (18–30%); and (5) poor households with family members employed locally as agricultural labourers by wealthier farmers (13–25%). Due to differential soil management over long periods of time, and to ample diversity in resource endowments (land, livestock, labour) and access to cash, the five farm types exhibited different soil carbon and nutrient stocks (e.g. Type 2 farms had average C, N, P and K stocks that were 2–3 times larger than for Types 4 or 5). In general, soil spatial variability was larger in farms (and sites) with poorer soils and smaller in farms owning livestock. The five farm types identified may be seen as domains to target technological innovations and/or development efforts.

## Keywords

- Sub-Saharan Africa;
- Farming systems;
- Integrated soil fertility management;
- Wealth ranking;
- Recommendation domains;
- Near-infrared spectroscopy;
- Carbon;
- Nutrients

