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"Can agroecological farming feed the world?
Farmers' and academia's views"

Can low-input agriculture in semi-arid Burkina Faso feed its soil, livestock and people?

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Abstract

Agriculture in semi-arid Burkina Faso is dominated by mixed crop-livestock smallholder farms with limited investment capacity in production factors (e.g. improved seeds, fertiliser and equipment). Hence, to maintain production, farmers try to make the best use of available resources based on principles of agro-ecology, including crop diversity and nutrient and biomass recycling). We investigated farm-level management of resources (soil, crops, manure, fertiliser and livestock) through time to assess whether the current management options were able to sustain crop and livestock production and fulfil household food requirements. We ran a one-year detailed farm monitoring campaign in collaboration with 22 volunteer farms representing the diversity of the farming system in our study area. We quantified inputs and outputs in the cropping system (244 plots) for one rainy season. In addition, the weekly dynamics of crop residues left on field was quantified up to 12 weeks after harvest. Moreover, inflow and outflow of resources at farm-level were quantified weekly. The cropping system was characterised by a negative nitrogen balance of about 10 kg N ha^{-1} at the farm level. At the field level, cereal-legume intercropping significantly reduced the nitrogen deficit from -23.7 kg N ha^{-1} (sole cereals) to -4.8 kg N ha^{-1}. Dry season livestock grazing caused the amount of crop residue left on the soil after harvest (739 kg DM/ha on average) to quickly reduce at a rate of 26–76 kg DM ha^{-1} per week, leaving very little mulch as organic amendment. Livestock protein requirements were rarely met from farm-produced feed with average feed gaps ranging between 22 and 94 % of the requirements for small herd and large keepers respectively. Large livestock (cattle) owners relied on transhumance during the rainy season, grazing and frequent purchase of crop residues and concentrates to feed their livestock. Concerning food availability in the household, the amount of grain produced (89–175 % of food required) was generally enough to fulfil household requirements. Our detailed farm data indicates that a better integration of legume crops in the cropping system associated to improved manure and forage management is needed to sustain crop and livestock production.

Keywords: Agro-ecology, crop-livestock, efficiency, farming system

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