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## Comparative Evaluation of Labour Use and Profitability of Renewable Soil Fertility Replenishment Technologies in Southern Africa

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### Abstract

The degradation of soil fertility in Sub-Saharan Africa is a major threat to food production in Africa. The problem is caused by increases in human population that have led to a reduction in per-capita land availability and a breakdown of the traditional fallow system as well as the low or non-use of fertilisers due to high costs. A number of practices based on nutrient recycling principles have been developed to assist smallholder farmers improve their soils. Information on the labour use requirements and profitability of these practices has been lacking. Based on field research conducted in eastern Zambia, this study estimated the labour inputs and the financial profitability of different soil fertility management practices (SFM). Results show that when aggregated over a five-year cycle, the labour inputs used in agroforestry fields were lower than that in fertilised maize fields that were cultivated continuously but higher than in non-fertilised fields. Both the total quantity and timing of labour requirements during the farming season in other crop fields managed by farm households are important to farmers. With Net Present Value (NPV) ranging between \$233 and \$309 per ha, agroforestry-based practices are more profitable than de facto farmers' practice (continuous maize production without fertiliser) which yielded an NPV of \$130 ha<sup>-1</sup>. However, agroforestry practices were less profitable than (subsidised) fertiliser which yielded NPV of \$499 ha<sup>-1</sup> and non-subsidised mineral fertiliser which had NPV of \$349 ha<sup>-1</sup>. The return to labour per person day was \$3.16 in subsidised fertilised fields, \$2.56 in non-subsidised fertilised maize, between \$2.55 and \$1.90 for agroforestry and \$1.10 in unfertilised maize fields. These returns compared with a daily agricultural wage rate of \$0.60 in the study area. Quantity and temporal distribution of labour requirements are important for technology evaluation. Price of maize grain, labour wage rate and cost of fertiliser exerted greatest influence on the financial profitability (and hence potential adoptability) of land management practices. Agroforestry has the potential to contribute to soil fertility replenishment and improved livelihoods of smallholder farmers if they are properly targeted to geographic and social niches and, disseminated in conducive policy environment.

**Keywords:** Agroforestry, benefit cost analysis, nutrient cycling, project analysis