Abstract

Strategies for poverty alleviation and sustainable natural resource management focus on technologies for improving yields. Increasing returns to scarce factors requires input substitution. This flexibility can be hindered by timing requirements of input applications or when complementary inputs are not available. Such constraints apply when soil organic matter content is too low for enabling efficient nutrient uptake, or when soil structure limits water infiltration and moisture retention.

This paper focuses attention on the importance of labour for soil conservation and input applications that enhance input efficiency in highland areas cropping systems in Eastern Africa. Given the inherent complementarities between labour and material inputs during critical phases of the plant growth process, input efficiency strongly depends on labour allocation. We present a stylised dynamic bio-economic modelling framework to discuss the available options for improving input efficiency in agricultural production. Input response equations are used that consider the returns per unit of land and labour as a function of certain combinations of material inputs and labour. Critical trade-offs may arise when opportunity costs for labour are high and/or when complementary inputs appear as binding constraints. The model enables to assess feasible pathways for sustainable intensification in typical settings of the East-African highland region.