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“Bridging the gap between increasing knowledge and decreasing resources”

## Soil Fertility after Six Years of Organic and Conventional Management in two Long-Term Field Experiments in Kenya

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### Abstract

Soil fertility is at stake in many regions of sub-Saharan Africa. 500 Mio hectares are affected by some kind of degradation, equivalent to 22% of the potentially productive land of the African continent. Restoring soil fertility and increasing stability of soil is an urgent call to farmers and officials. Building soil organic matter by using organic and mineral fertilisers is an important part of it. The use of available organic resources is not limited to organic farmers, but they may serve as an example on how strictly organic fertilisation is altering soil characteristics. In the SysCom project organic and conventional farming systems are compared in India, Bolivia and in two field trials in Kenya.

The Kenyan trials have been started in 2007 in Thika and Chuka. A three year rotation with maize, beans, vegetables and potatoes is running in each of the replicated organic and conventional farming systems. Each system is performed at low (subsistence level) and high input (export oriented) level. Soil samples from the top 20 cm were analysed at the start (2007) and at the end of each crop rotation period (2010, 2013). All samples were analysed for Corg, Ntotal, pH, Ptotal, Presin. In soil samples from 2010 and 2013 soil microbial biomass, soil respiration, dehydrogenase activity and alkaline phosphatase activity were additionally determined.

The field site in Chuka showed clearly higher level of soil fertility than the one in Thika. Total soil contents of C, N and P showed little change over time and treatments, whereas soil microbial biomass and microbial activities showed differences between farming systems and intensities. In Chuka soil microbial biomass in high input organic systems developed to higher levels than in all other treatments, whereas in Thika the differences between treatments were not significant. High input systems in Thika showed higher dehydrogenase activity than low input systems, but overall Thika soils appeared to be less responsive to the treatments than the ones in Chuka.

**Keywords:** Farming systems, Kenya, soil fertility, soil microbial biomass, soil organic matter