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## Crop Productivity and Contributing Factors in Organic and Conventional Farming Systems in Kenya - Evidence from a Long-Term Experiment (SysCom)

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### Abstract

Contributing to the global debate if organic can feed the world, the Research Institute of Organic Agriculture (FiBL) has started two long-term trials in Kenya. The Trial sites at Chuka and Thika are situated in the subhumid zones of the Central Highlands. At each site, conventional farming (Conv) and organic farming (Org) were compared at two input levels: high inputs (High) representing export-oriented, large scale production and low inputs (Low) representing smallholder production mainly for domestic use. The conventional system received mostly synthetic fertiliser and used synthetic pesticides. The organic system only used organic fertiliser and bio-pesticides. The differences between input levels were the amount of nutrients supplied and supplementary irrigation. The crop rotation included maize (*Zea mays*), different leafy vegetables (*Brassica oleracea*, *Beta vulgaris*), leguminous crops (*Phaseolus vulgaris*, *Glycine max*) and potatoes (*Solanum tuberosum*). After twelve years of continuous cropping, we encountered some trends with regards to productivity in organic and conventional systems: Grain maize, baby corn and common bean were able to achieve similar yield in organic and conventional, whereas cole crops, French beans and potatoes showed significant lower yields in organic. For example, cabbage showed 40% higher yields in conventional high input system compared to organic high input system. However, our results showed that productivity often depends on the crop and the chosen management practice within a system. Some crops like grain maize were able to achieve similar yields because crop nutrient supply in organic systems was sufficient and pest and disease were of minor importance to the crop development. On the contrary, we experienced that the organic systems were less productive if management practices were guided by conventional mindsets - substitution of synthetic products by biological ones was not sufficient and other more system-based approaches like mixed cropping or pest resistance varieties need to be incorporated to achieve better outputs. Additionally, it must be mentioned that high productivity might not be enough to declare a farming system sustainable or not. Organic farming systems in our trials were also able to show positive effects on soil fertility, human health and biodiversity.

**Keywords:** Crop productivity, farming system research, organic farming

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