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“Can agroecological farming feed the world?
Farmers’ and academia’s views”

Crop productivity improvement in organic agriculture through a system-based approach

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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. At each trial site (Chuka and Thika), 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 systems 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, especially nitrogen and phosphorous, and supplementary irrigation. After twelve years of continuous cropping, we encountered some trends regarding productivity in organic and conventional systems: Grain maize, baby corn, and common bean achieved similar yields in organic and conventional, whereas cole crops, French beans, and potatoes showed significant lower yields in organic. Although organic systems showed positive effects on soil fertility, human health, and biodiversity, productivity (and thus food security) is essential for farmers and societies considering switching to a more sustainable farming approach. It is also good to note that the organic systems within the trials were guided by conventional mindsets -i.e., substituting synthetic products with biological ones without adapting other more system-based approaches. Thus, after four crop rotations (2007–2018), we adapted a best-practice approach feasible for farmers in the high input systems in the fifth rotation. For example, we used mixed cropping (push-pull) and improved plant extracts in the organic high input system to manage pests and disease. Preliminary results show that we were able to improve yields in organic systems significantly, e.g., yields in organic French beans production were higher in the fifth crop rotation than in the previous season, closing the gap between organic and conventional systems. However, we are still working to improve management practices in all the systems, focusing on water and soil fertility management.

Keywords: Farming systems, Kenya, long-term experiment, organic agriculture