

Crop productivity and contributing factors in organic and conventional farming systems in Kenya

Evidence from a long-term experiment

David Bautze¹, Edward Karanja², Martha Musyoka², Noah Adamtey¹
¹ Research Institute of Organic Agriculture (FiBL), Switzerland
² International Institute of Insect Physiology and Ecology (icipe), Kenya

Introduction

- Knowledge gap of comparative performance between organic and conventional farming systems in tropics
- Several long-term experiments in temperate regions show organic farming as suitable alternative to conventional
- Research Institute of Organic Agriculture (FiBL) starts long-term experiments in three tropical countries (Kenya, India and Bolivia) in 2007/2008
- Two long-term experiments in Kenya (Chuka and Thika) with different soil fertility and weather conditions



Figure 1: The long-term farming system experiment at Thika in the Central Highlands of Kenya

Methodology

- Maize-based crop rotation with grain maize, babycorn, vegetables, legumes and potatoes
- Comparison of organic (Org) and conventional (Conv) system at two input levels: high inputs (High) representing export-oriented, large scale production and low inputs (Low) representing smallholder production mainly for domestic use
- Conventional systems received mostly synthetic fertilizer and pesticides; organic systems used organic fertilizer and bio-pesticides
- Differences between input levels were the amount of nutrients supplied and supplementary irrigation

Results

- Yields were higher at Chuka compared to Thika; especially in low input system

Maize crops

- Grain maize sole and inter crop as well as babycorn show generally similar yields in organic and conventional system within each input level

Leafy vegetables

- Cabbage and kale yields were generally higher in conventional systems (+50 resp. 75 %) compared to organic; Swiss chard showed higher yields in organic (+25 %)

Leguminous crops

- French bean yields were mostly higher in conventional systems compared to organic; (+50 %) common beans yielded similar when planted as sole crop; common bean as inter crop yielded higher in organic (+25 %)

Potato

- Potato tuber yields were higher in conventional system compared to organic system within each input level (+50-75 %)

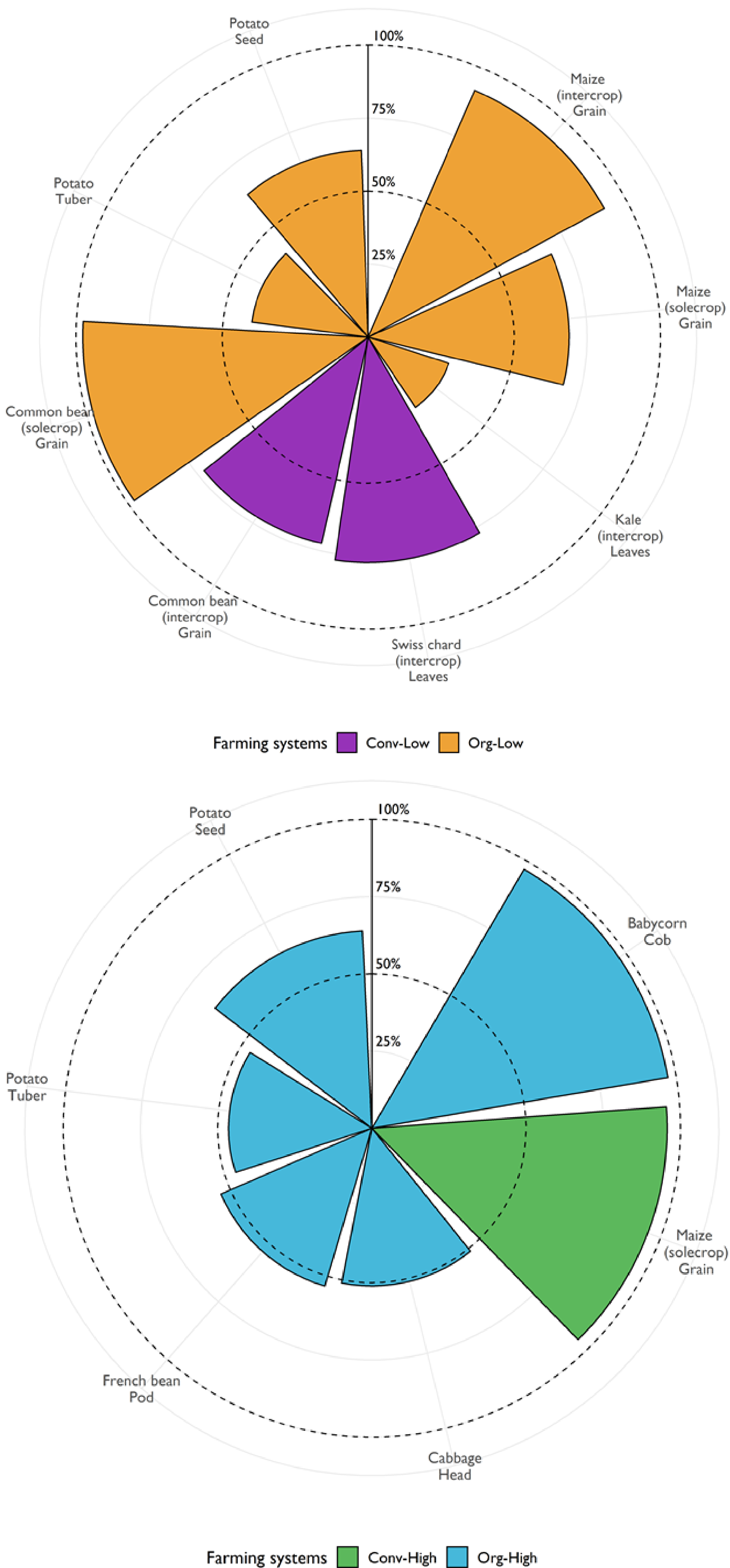


Figure 2 Average crop yield ratio between organic and conventional system at Chuka (100% = highest yielding system)

Discussion

- Yield differences can mostly be explained by nutrient, pest and disease and water management of systems
- High input system perform better than low because of sufficient nitrogen and phosphorous availability and supplementary irrigation
- Pest and disease incidence in cabbage, kale and potato are main reasons for lower yields in organic systems (- non-effective of bio-pesticides)
- However, besides the lower vegetable and potato yields in organic system we found positive effects on environmental and human health

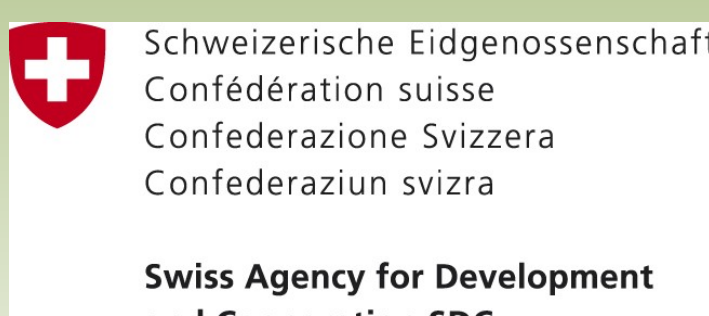
Conclusions/Recommendations

- The amount of nutrient applied, the type of water management, and the effectiveness of pest and disease control were the major factors driving crop productivity.
- Similar yields were obtained between organic and conventional farming systems as a result of effective pests and disease, water and nutrient management. This indicate that if the appropriate and adopted best management practices are used, similar productivity is possible.
- The authors recommend the need i) to investigate into the efficacy bio-pesticides/botanicals recommended for organic production, and ii) to explore and integrate other best practices known to reduce pests incidence (e.g. push-pull technology).

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