

## SysCom and ProEcoAfrica/OFSA projects

Increasing knowledge on organic agriculture  
in the tropics



There is continued global debate on which agricultural production systems are more productive, natural resource conserving, environmentally friendly, economically viable and accepted by society. Many stakeholders have raised concerns about the long-term impact of conventional agriculture on soil productivity, yields and the ecosystem. Organic agriculture is one of the prominent alternative farming approaches, advocated for its benefits to health, environment and social welfare, but is generally perceived as not productive enough to meet growing food demands.

Several studies conducted under temperate environments (mostly in Europe or Northern America) have established the benefits of organic farming over conventional farming. However, it has been questioned whether organic agriculture can contribute to sustainable development in tropical conditions. SysCom and ProEcoAfrica/OFSA projects aim to fill this knowledge gap by working closely with farmers to design and undertake research in Ghana, Kenya, Uganda, India and Bolivia.



## SysCom

### Long-term Farming Systems Comparison in the Tropics

**Duration:** 2007– ongoing

**Goal:** Enhance know-how on potentials and limitations of different agricultural production systems, namely organic and conventional systems, in three tropical countries (India, Kenya and Bolivia) contributing to sustainable agriculture.

**What the project is doing:** The SysCom program has been running for over a decade in diverse agroecological environments. Four long-term experiments were established in Kenya, India, and Bolivia between 2007 and 2008 to evaluate organic and conventional production systems performance. Farmers are involved in the projects through LTE trial visits, POR activities, workshops and extension counselling.

- Long-term experiments (LTE): compare organic and conventional farming systems in different variations, reflecting the diversity of the farming systems in each of the countries and the variability of the input levels. The LTEs capture long-term changes and monitor the effects of contextual developments through observation of agronomic, economic, and ecological parameters over time. They are dynamic research instruments which are adapted according to the experiences of the previous years.
- Participatory on-farm research (POR): The LTEs are complemented by PORs on innovations adapted to local farmers' conditions. Working 'with farmers, for farmers, by farmers' to find solutions to the most imminent farming challenges. Applied management topics that are not covered in the LTEs are also taken up on a need basis for advisory services. Farming practices tested on the LTEs are also taken up by local farmers, allowing innovation and empowerment.

**Concrete results:** Results from long-term trials in Kenya, India, and Bolivia reveal that the profitability and productivity of organic agriculture can equal conventional agriculture. Furthermore, this long-term research shows that well-managed organic farming systems can increase soil fertility, reduce pesticide residues, and enhance biodiversity. Further, the project found that:

- Crop yield in organic systems can equal conventional systems, yet varies depending on the type of crop and management practices.
- Active systematic approach of organic systems was the major influencing factor in crop productivity.
- Soil fertility can be improved over the long term with good organic management. We could also show that organic systems build up important crop nutrients, have a higher biological activity and improve soil physical properties.



## ProEcoAfrica and OFSA Projects

### Productivity, Profitability and Sustainability of Organic and Conventional Farming Systems

**Duration:** 2013 to 2021

**Goal:** Increase the availability of scientific evidence and knowledge on the productivity, profitability and sustainability of ecological organic agriculture in comparison to conventional systems in Ghana, Kenya and Uganda for better-informed decisions, practice and policy.

**What the projects have done:** The ProEcoAfrica project worked with 1,645 smallholder farming households in Ghana and Kenya to collect productivity and profitability data over five seasons from the same farms between 2014 and 2017. The OFSA project applied the SMART-Farm tool to assess farm sustainability, based on four dimensions (i.e., environmental, social, economic and governance) in Ghana, Kenya, and Uganda.

**Concrete results:** Our research shows that organic agriculture and agro-ecological practices can improve productivity, profitability and sustainability in smallholder farming:

- Productivity on organic farms was similar to conventional.
- Farm incomes on organic farms more than doubled compared to conventional, despite the fact that the farmers realised no organic price premium.
- Sustainability: OFSA project findings showed that the greatest impact of organic farming was on environmental sustainability attributes. Organic farming also positively influenced some social, economic and farm governance attributes much more than conventional farming, but to a lower extent compared to environmental sustainability attributes.

Organic management frequently had some positive impacts on the environment, e.g., on soil and water quality, especially due to organic soil amendments and the elimination of synthetic chemical pesticides. Organic management also positively impacted capacity building, food safety, and farm working conditions, particularly due to the improved governance of smallholder farmer cooperatives.

The projects also found that it is important to pay attention to the organic conversion process and provide regular training, tailored coaching and technical backstopping on organic management and address emerging production problems.

It was found that organic initiatives did not lead to widespread adoption of active, system-oriented ecological organic management (e.g., integrated pest and disease management, intercropping, agroforestry, etc.). The projects, however, concluded that to be successful in organic production, farmers must go beyond just eliminating chemical-synthetic inputs and engage in active organic management practices on their farms, in line with agroecological principles and practices.



## Where the projects work

SysCom works in Kenya, Bolivia and India. ProEcoAfrica and OFSA worked in Ghana, Kenya and Uganda.

**Ghana:** ProEcoAfrica worked in two sites, Ashanti region (based on cocoa systems) and in the North-East part of Ghana in West Mampurusi (a semi-arid region).

**Kenya:** ProEcoAfrica worked in three sites, i.e. Kirinyanga, using organic macadamia nuts as an entry crop, Machakos, using organic mango, and Murang'a using organic vegetables. SysCom has two LTE sites, i.e. Thika and Chuka, based on a three-year rotation with maize, beans, potatoes and vegetables, as well as one POR site, Kangari. The SysCom sites are at 1500 m.a.s.l. with an annual precipitation of 1500–2400 mm (Chuka) and 900–1100 mm (Thika) with mean annual temperature of about 20 °C.

**Uganda:** ProEcoAfrica worked in two humid sites (Sheema and Kasese) based on certified coffee (Fair Trade, Fair Trade Organic and conventional).

**India:** Syscom India is located in Madhya Pradesh State in a semi-arid climate, at 200–300 m.a.s.l. with with an average annual precipitation of 800 mm in a single peak monsoon season, usually lasting from mid-June to September. Temperature ranges from 15–49 °C and is highest in May/June and lowest in December/January. The main crops are cotton, soybeans and wheat, compared in a two-year crop rotation (conventional, organic and biodynamic).

**Bolivia:** SysCom Bolivia is located in the Yungas of the department La Paz, at 380 m.a.s.l. with an average 1400 mm mean annual precipitation, 25 °C mean annual temperature, and 83 % mean annual relative humidity. Organic and conventional management are compared, as well as the performance of diverse cocoa agroforestry systems to cocoa monocultures.



## Further information

### SysCom project

- Project website > [Link](#)
- Project Synthesis Report > [Link](#)
- Site Description Videos:
  - Bolivia > [Link](#)
  - India > [Link](#)
  - Kenya > [Link](#)

### ProEcoAfrica/OFSA project

- Project website > [Link](#)
- Project publications > [Link](#)
- Can organic agriculture improve yields and incomes for smallholder farmers in Africa?  
Video: > [Link](#)

## Imprint

This brief is a part of a series of knowledge products created within the KCOA project, analysing the outcomes of the SysCom and ProEcoAfrica projects. It explains these projects to provide readers with more information about the science behind the content of the other knowledge products in the series, e.g., factsheets, posters, videos, etc. > [Link](#).

The purpose of this series is to educate African farmers and advisors on research results related to organic farming.

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## Projects involved

