Productivity and Growth in Organic Value Chains (ProGrOV)

Policy Brief

Knowledge generation through research in organic farming systems and organic value chains can increase productivity of smallholder farming and help to improve food security and livelihoods! But value chain governance is crucial!

This is what has been demonstrated in the project 'Productivity and Growth in Organic Value Chains (ProGrOV)' in Kenya, Tanzania and Uganda. Organic farming based on agroecological methods holds potentials to be a viable development pathway for smallholder farmers. However, organic farming is dependent on knowledge and advanced management of the resources rather than input of chemical pesticides and fertilizer. Furthermore, for the full development and benefit of organic farming the farmer must have access to high value markets where prices that match the quality of the products can be achieved. Finally, the costs involved in accessing the markets (transaction costs) and the risks taken must be manageable for the farmer – either individually or for groups of farmers. Smallholder farmers have limited resources to engage in knowledge and market development. Therefore, policies and institutional support are necessary for this promising sustainable development pathway for smallholder farming to flourish – policies and institutional support that facilitate knowledge generation as well as reduce transaction costs in the chains and facilitate access to high value markets.

Introduction

The overall aim of ProGrOV was to provide research based knowledge for supporting increased productivity and sustainable growth in organic production and value chains and to build capacity for future research and development of organic value chains in Kenya, Tanzania and Uganda. ProGrOV tested agroecological practices at farmers' fields in order to reduce pests, improve yields and quality using low cost resources mostly available locally in organic farming systems. We also studied if and how dairy cows on farms may be integrated better in the organic farming systems for value addition and diversification. Furthermore, we carried out studies to analyze the organic markets, identify potentials and diagnose bottlenecks in the value chains from the production on farm to high value markets in order to propose improvements to their governance and reduce transaction costs. The results demonstrate that productivity of organic value chains can be increased though the application of sustainable agroecological methods as well as through improved market access and integration of farmers in the value chains.

Background

East Africa's agribusiness sector faces the challenges that most crops are produced by small-sized farms with poor market access and limited capacity for quality assurance and grading for high value chains in combination with limited access to inputs and extension services and declining soil fertility combined with changing rainfall patterns. There is potential for increasing income and value addition in farming communities based on agro-ecological practices and organic agriculture given that market links can be strengthened to benefit from the potential demand for organic products in the East African high value domestic market, the tourism sector and for export markets.

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ProGrOV chose to address research needs under four headings:

- **Soil fertility:** The need for sufficient nutrients for plants to grow is in organic systems covered through application of organic material, integration of nitrogen fixing crops and fallow. Knowledge on synergies of different methods and the best management of nutrients is limited and research is essential.
- **Pest:** Pest damages to yields as well as quality are challenges in organic systems and they may be controlled preventatively through farm management practices. Knowledge development of how best to suppress pests and increase beneficial insects and the relationship between different practices is urgently needed.
- **Integration of livestock:** Livestock plays an important role in rural areas of East Africa and could contribute with major inputs to the nutrient cycle on the farm, and to the livelihood of the families through animal products for the local market and home consumption. Integration of the animals in the organic production has the potential of additional income from the products but also provides a range of
- challenges that needs to be explored and solved.
- **Governance of organic value chains and markets:** Smallholders have individually very limited access to information about markets, limited bargaining power towards chain actors, as well as limited alternative opportunities to market their products in other than local markets. There is a need for information and chain development that can lead to increasing smallholder farmers' benefits from higher yields and higher product quality in organic systems.

Results

Research in organic farming systems and organic value chains, as well as in agroecological practices that can be applied in organic production in East Africa, is limited. With nine PhD studies, nine MSc studies at the three universities, University of Nairobi, Sokoine University of Agriculture, and Makerere University, undertaken with support from supervisors at the three universities as well as supervisors from Danish universities in a team effort across borders, the first steps have been taken to develop a platform of expertise that can support further research and development in agroecology and organic farming systems in the future. With the active involvement of the national organic agriculture movements and participatory approaches, the research has reached out to a large group of stakeholders. This collaboration has created a new alliance between the universities and the organic organizations and together they have initiated activities for the development of the organic sector.

Overall, the results show that farmers may improve crop yields and quality by using more knowledge in crop management and by intensifying their use of locally available resources. Examples of results is provided in the following sections.

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Soil fertility in organic farming systems

Intercropping of legumes with cash crops and supplementing FYM and/or rock phosphate improves total yield.

In Kenya and Tanzania crops of kale, maize and tomatoes were intercropped with legumes and supplemented with rock phosphate. The experiments demonstrated that this could double or even triple yields from the farmers' fields and give the same effect as using recommended amounts of farmyard manure, which is limited on most farms. The legumes contribute nitrogen to the accompanying crop and thus the total yield of the mixed crops is higher than when farmers cultivate kale, maize or tomato as mono-crops even when supplemented with manure. However, for this to be an interesting practice for the farmers, the legume grown should be either attractive for local consumption or suitable for a market accessible to the farmers.

Knowledge on soil dynamics and the biological release of nutrients from green manure is important for the timing of crop management.

To have an effective green manuring requires a clear management. First, the biomass that is used for green manuring has to be of a high quality in terms of nutrient content and degradability. Secondly, it has to be treated and applied so the release of nutrients from the green manure is synchronized with the new crop's demand of nutrients. Such strategies are however knowledge intensive as they differ hugely from common practices of leaving residues at the fields into the dry seasons for livestock browsing or decomposition. In the current experiments, the mature stems and foliage from two grain legumes after harvesting the grains (chickpea and lupine) or green biomass from two foliage-rich grain legumes (mucuna or green gram) were collected and stored until the new planting season. They were then applied and incorporated and their release of nutrients studied. In all the studied cases, the release of nutrients from the applied green manures were rapid and were able to supply major amounts of the important crop nutrients like nitrogen, potassium and phosphorus within the period that the new high demanding cash crop required the supply. This underlines the possibility for small-scale farmers to use, produce and manage their own nutrient supply to enable a production of high value market-friendly crops.

Pest management in organic farming systems

Mulching can reduce insect pests while improving soil fertility and save water in the soil.

When farmers in Lushoto, Tanzania, cover their tomato fields with a layer of plant residues (mulching) there is a reduced need for weeding which saves labor and at the same time tomato yield and quality becomes better on mulched plots. It is well known that mulching can also conserve soil moisture and be a source of plant nutrients from the decomposing plant material. Working together students and farmers found that 15 cm deep mulches from two locally available sources, a local pine tree and lemongrass, performed better against weeds than a thinner layer of mulch or other types of mulches; and that mulching also favored natural enemies of insect pests and reduced insect pest infestation.

Pineapples worst pest, the mealybug, may be controlled by improved biological knowledge.

Pineapples are a major export crop of Uganda, and the most damaging pest is mealybugs.
The ProGrOV project could document that there is only one species of mealybug causing the damage in both of the major producing regions of Uganda, Dysmicoccus brevipes. Knowing the species' identity is an important step for advising on control measures. A large-scale study of cropping practices showed that mealybug population densities were lower in a pineapple–banana intercrop system than in a sole pineapple crop across seasons. Earthed-up seedbeds registered higher mealybug densities than flat seedbeds. Earthed-up seedbeds created a more favorable environment for mealybug multiplication than flat beds.

Use of coffee husks as a soil fertility amendment promoted mealybug population build up whereas fallowing had a reducing effect. More in-depth studies on the role of soil moisture and soil cover in mealybug population build-up in pineapples are recommended.

Integration of livestock in the organic farming system

Lack of land for animal feed production and grazing is a major challenge for organic animal farming – but there are good possibilities for more local recirculation of feed and manure

Although farming systems are mixed, there is often very little integration and synergy and the contribution of animal herds to crop production is limited – sometimes due to the distance between the farm and the cash-crop production land. A process for turning pineapple residues (peel and leaves) into silage for dairy cattle was developed and tested on dairy cattle in Uganda. The production of silage including pineapple residuals was demonstrated to be a good option for providing feed for cattle, but resource demanding, for example in relation to securing good packing and storage possibilities. Many farmers had too little land available to meet the organic requirements for livestock such as access to grazing areas, and in such cases, involvement of local communities in feed production and use of grazing areas could have potential of mutual benefits. The studies concluded that there are good possibilities for more local recirculation of feed and manure, although with limited benefits in terms of manure and compost production when there are only few animals on the farm, and a relatively larger area of land for crop production.

Integration of livestock for production of organic milk still has a long way to go!

The studies also looked into the organic farmers' possibilities for diversifying their income through sale of organic milk. In some cases, the milk production at the study farms was low: few liters of milk per day and in some instances only during a limited period of the year. To be able to benefit from integrating the livestock milk production into the organic system, milk must be produced year round at a scale that can cover the cost of certification and the efforts of organizing the grazing and producing organic feed that comply with organic standards. The findings of these studies point to the fact that the production of organic dairy and other animal products at certified organic farms in East Africa will need considerable development, if dairy cattle should be fully integrated and the farmers benefit economically. If certified organic smallholder farms should diversify their income through sale of organic milk, they would need a secure market, apart from improvements on their farm regarding animal health, welfare and feed production. A focus area for future development is choice of breeds and breeding strategies, because there is a need for dairy breeds which need to be robust and yet, more productive.

Governance of organic value chains and markets.

Improved governance of value chains provide potential for better market access for smallholder farmers.

The studies demonstrated that there are opportunities for smallholder farmers' access to both export and domestic markets for organic products. However, potential markets are not developed due to market failures, and lack of proper governance structures that support the building of trust and sharing of risks among the actors in the value chains, and support the advantages of marketing under the organic brand. Results from the tourist sector in Tanzania showed for example, that even though hotel owners were purchasing local organic foods, they did not take advantage of this in their marketing. Likewise, organic premiums to the farmers were often suppressed or simply obtained by the intermediaries. This indicates that there is an untapped potential for increasing the share of organic food offered in the various organic markets as well as for farmers to benefit from their efforts.

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ProGrOV has identified a number of other market failures currently constituting barriers for the development of the organic sector. Opportunism is a major barrier. Poor smallholder farmers short on cash, selling fresh products, without proper storage facilities and with limited mobility to markets and market information, makes them easy pray for intermediaries as well as prone to 'hold up' situations – be it organic or conventional buyers – a common situation in the pineapple market in Uganda.

The domestic organic value chain in Nairobi Kenya was observed to be short- from the producer directly to the retailer or to the consumer without much involvement of traders and transporters. Production and retailing were the two functional levels where significant chain activities took place. Similarly, few input suppliers were observed. About 57 percent of the organic vegetable output was marketed through the organic outlets.

The balance was sold in the conventional markets due to lack of certification and production in small volumes.

The building of trust between producers and marketers is also an important issue. In the course of the project, we have come across examples and stories of disappointed marketers in cases where farmers have not delivered or sold their products via other channels. The reasons for the farmers to disappoint have been linked to difficulties in securing transport to the market, or in timing the harvest with the agreement with the marketer. In other cases, a non-organic buyer has showed up at the doorstep with money at hand, thus tempting the farmer to sell even at a lower price than the organic marketer would offer.

Conclusions and implications

Agroecology and organic production may serve as vehicles for intensification of resource poor farms with limited access to external inputs. With the specific innovations tested or developed in different locations, ProGrOV has demonstrated the potential for improving organic production of high quality crops for different markets through agroecological practices in organic systems. Integration of organic dairy production in the organic smallholder cropping systems has however proven to be less promising than expected, due to lack of a strong tradition for combining it with the production in the cash crop farms. The limited production in individual smallholder farm units do not seem to be sufficient to carry the efforts needed for organizing sufficient organic fodder supply and the development of systems to promote animal health.

ProGrOV developed a concept for linking research and development across value chains of selected products through cross-disciplinary collaboration between universities and stakeholder organizations. However, more capacity in analyzing and providing innovative solutions for improvements in value chain governance is still to be developed. Actors in the value chains need new methods build on locally available inputs as well as frameworks for securing long-term engagement and building trust between them. Further developments could be innovative contract arrangements, which reduce the risks and transaction costs for farmers as well as traders and buyers of high value products. Private-sector led initiatives may improve smallholder farmers' market access, improve capacity for intensification and thus create economic development. A supporting institutional environment can draw on these results to improve success rates and sustainability and by addressing potentials to improve national and regional markets it will furthermore stimulate economic growth.

The research capacity and interest in this area established through ProGrOV among a group of young agronomists and economists in East Africa, provide the foundation of a network for intensification of smallholder farms through agroecological and organic farming practices. The collaboration established with the industry and the national organic agriculture organizations provides a potential for professionalization of the agroecological and organic farming movement.

Further research will provide the farmers and value chains with more scientific evidence of the economic and social advantages of agricultural intensification based on improved knowledge and use of locally available resources rather than intensification based on purchasing expensive external inputs.

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Recommendations

Strategies should be developed at national level for directing resources into research and innovation of agro-ecological methods that can strengthen the productivity, resilience and robustness of organic smallholder farming systems. Strategies should include identification of research needs and the development of national research agendas for agroecological methods and organic farming systems.

Furthermore, to tap the full potential market for organic produce (both domestic and export), stronger engagement from supporting governmental and non-governmental institutions is important to minimize market failures and to create an enabling environment for, for example the national organic movements to play an important role in organizing smallholder farmers.

As regards development of more efficient market and value chain governance, we recommend improved organization of intermediaries and farmer groups for growth of the chain, to stabilize costs and prices and to facilitate increasing volumes. However, additional transaction costs would arise from such organization. Means of dealing with such costs need to be developed, but would include trust building and institutional support through contracts. Institutional systems and regulations connecting production with markets in a better way would also facilitate the development of smallholder organic systems. The certification system established by the International Federation of Organic Agriculture Movements is a marketing tool through which farmers and producers are connected with the market and the consumers globally and nationally. Through certification, the organic sector builds traceability and thus credibility of the organic produce. Certification costs is, however, a burden for smallholder farmers. Therefore, a so-called Participatory Guarantee System (PGS) has been developed as an alternative. Participatory Guarantee Systems (PGS) are locally focused quality assurance systems. They certify producers based on active participation of stakeholders and are built on a foundation of trust, social networks and knowledge exchange. PGS initiatives are serving thousands of small organic farmers and their consumers all over the world, and the numbers are increasing every year. National initiatives to facilitate the development of such systems would benefit the development of a domestic market for sustainable agroecological products.

Facts about ProGrOV

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The project is a collaboration between ICROFS, University of Nairobi (KE), Sokoine University of Agriculture (TZ), Makerere University (UG), Aarhus University (DK), University of Copenhagen (DK), Technical University of Denmark (DK), the national organic movements KOAN (KE), TOAM (TZ), NOGAMU (UG).

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