Nevertheless, education and discussions 

Abstract
Market orientation and food security improvements of smallholder farmers are sometimes contradicting livelihood strategies. The ‘Linking Farmers to Markets’ (F2M) project aimed at empowering farmers to get linked to organic markets while at the same time enhancing food security. The study investigates if the project contributed to change the food security behaviour of smallholder farmers to improve their food security situation. Attitudes and knowledge changes were the main domains to explore changes. Group discussions and individual structured interviews were conducted in Hoima, Western Uganda, with five target groups participating in the F2M project and four control groups. Results showed that there are significant differences between the two sample units. Changes in various indicators of availability (yields increased), access (income raised), utilisation (quality of food improved) and stability (food availability throughout the year increased) were observed. Differences in behaviour are mainly found in self-sufficiency, land use for food and cash crops, food composition and storage. F2M farmers on average grow more food by themselves, use less income to purchase food, consume a diverse diet and store more food. This was possible through more efficient land use and strong emphasis on food crops. Through the F2M project it was possible for F2M farmers to raise income and self-sufficiency at the same time. Raised income is left for non-food purposes, like education and health. Female farmers decide more often about cultivation and money spending. Nevertheless, gender equality is still challenging, especially regarding intra-household food allocation. The F2M project contributes to food security behaviour changes through knowledge and awareness raising trainings. F2M farmers could improve their ability to deal with food security constraints. Nevertheless, there are still numerous challenges farmers have to face, like sickness, weather changes, land scarcity, pests and diseases.

Key-words: behaviour change, food security, Enabling Rural Innovation (ERI), organic agriculture, Uganda

Uganda
Uganda is home to a population of 27.2 million (State: 2005), nearly 85% of whom live in rural areas. Poverty is especially still severe in rural areas (Appleton, 2001 in Pender et al., 2004; MFPED, 2005). According to the United Nation’s Human Development Index (HDI), Uganda ranks 145 out of 174 countries (MFPED, 2002; UNDP, 2010). Uganda’s economy is dominated by the agriculture sector (UNDP, 2010). Especially the rural population depends on agriculture. Low agricultural productivity, land degradation, poverty and thus food insecurity are still consistent problems (Pender et al., 2004).

Farmers in Uganda often cannot afford expensive chemical pesticides and fertilisers. Organic agriculture provides considerable potential for development in this context (Willer et al., 2008). In 2007 almost 300.000 hectares (more than 2 % of total agricultural land) were used for organically production by more than 206.803 organic farmers (Organic-world.net, 2007). Uganda has the largest percentage of land for organic agriculture in Africa (Hauser & Delve, 2007). Export is the driving force of the organic sector in Uganda (Taylor, 2006). Organic agriculture in Uganda is based on small-scale farming, where women are carrying the majority of work load (Hine & Pretty, 2006; Taylor, 2006).

Although Uganda is regarded as food secure at the national level (FAO, 2005 in Hine et al., 2006), according to Bahiigwa (1999) 41 % of the households are affected by permanent food insecurity. There are differences between the regions. Western Uganda, where the study area is located, is considered as
Objective

food secure, according to a nationwide study of Bahiigwa (1999). Nevertheless, food insecurity also exists in this part of the country. According to Bahiigwa (1999), reasons for the food insecurity are mainly inadequate rainfall, pests and diseases and excessive rain.

**Enabling Rural Innovation (ERI)**

Enabling Rural Innovation (ERI) is a development using participatory methods to strengthen capacities of farmer groups to develop profitable agro-enterprises (Kaaria et al., 2007). According to Kaaria et al. (2007), farmers should ‘produce what they can market rather than try to market what they produce’ and are encouraged to pay special attention to natural resource management (NRM) in production (Kaaria et al., 2007).

The ERI process includes (1) the Participatory Diagnosis (PD), where farmers are searching for future livelihood goals, (2) the Participatory Market Research (PMR), where the farmers identify market opportunities for agricultural products to realise their goals, (3) the Farmer Participatory Research (FPR), where farmers form research groups to experiment with potential crops, (4) the Enterprise Development (ED), where agro-enterprises are developed and farmer groups merge their trading power to produce the appropriate quality and quantity of commodities for their markets, and (5) Participatory Monitoring & Evaluation (PM&E), where achievements and goals are reflected, re-planned and changes needed implemented to institutionalise learning and change processes (Hauser & Delve, 2007).

Critical factors for success are the creation of effective local partnerships and the building of human and social capital for empowerment. Women’s empowerment is a cross-cutting issue at all stages of the ERI process (CIAT, 2005). ERI is the central approach used in the F2M project, where the study was carried out.

**Linking farmers to markets (F2M)**

The ‘Linking farmers to markets’ (F2M) project was conducted in Hoima and Mukono, Uganda, in two phases (2003-2006; 2007-2010). The Enabling Rural Innovation approach was adapted to organic agriculture for the methodological backbone of the project.

The overall goal of the F2M project was ‘to contribute towards poverty alleviation, food security, improved nutrition and better resource management through market-oriented organic agriculture’ (CIAT and BOKU, 2006). Training by the F2M project were mainly on experimentation, data collection (of market information), group marketing, saving & credits, gender, HIV/AIDS, monitoring & evaluation, record keeping, group dynamics and sustainable agricultural practices (which included mainly organic principles, composting, pest and disease control, water and soil conservation, agro-forestry, kitchen gardens, partly nutritional needs). Food security was a cross-cutting issue during all trainings. The focus was on raising the awareness of being with enough food for home consumption and the importance of balancing between cash and food crops. Furthermore, they learnt about the importance of storage, kitchen gardens and child nutrition.
## Objective

The aim of the study is to reveal how and why the behaviour of farmers towards household food security changed, the influence of attitude and knowledge on behaviour change, and which impact behaviour change has on the food security situation.

## Sampling

Fieldwork took place in Hoima, Uganda, East Africa. Data collection has been carried out through 60 individual interviews (with female farmers), 9 group discussions (with both male and female farmers) and 9 feedback meetings. For the research five farmer groups, which were involved in the F2M project in Hoima (40 individual interviews) and four control groups (20 individual interviews) were interviewed to show differences between F2M farmers and non-participants.

## Results

The chapter analyses the household food security situation, behaviour, attitude and knowledge along the four dimensions by selected factors as illustrated in table 1. For this summary some factors were selected (for all results in detail see the full study).

### Table 1: Analysed factors along food security dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Situation analysed by ...</th>
<th>Behaviour analysed by ...</th>
<th>Attitude &amp; Knowledge analysed by ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>- Self-perception of overall food security situation</td>
<td>- Use of land for food crops</td>
<td>- Meaning of the term ‘food security’</td>
</tr>
<tr>
<td></td>
<td>- Times of food shortage</td>
<td>- Degree of self-sufficiency</td>
<td>- Knowledge about child nutrition</td>
</tr>
<tr>
<td></td>
<td>- Food security situation of children</td>
<td>- Decision-making patterns (Cultivation)</td>
<td></td>
</tr>
<tr>
<td>Availability</td>
<td>- Yields</td>
<td>- Use of land for cash crops</td>
<td>- Importance of food security (Knowledge about improved farming methods)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Share of purchased food</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Spending for food consumption</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Decision-making patterns (Money spending)</td>
<td></td>
</tr>
<tr>
<td>Access</td>
<td>- Income</td>
<td>- Use of land for cash crops</td>
<td>- Importance of cash crops vs. food crops</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Share of purchased food</td>
<td>- Knowledge about improved farming methods</td>
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<td></td>
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<td>- Spending for food consumption</td>
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<tr>
<td></td>
<td></td>
<td>- Decision-making patterns (Money spending)</td>
<td></td>
</tr>
<tr>
<td>Utilisation</td>
<td>- Quality of food</td>
<td>- Food composition</td>
<td>- Importance of dietary diversity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Frequency of eating vegetables (meat, fish, milk, eggs)</td>
<td>- Importance of vegetables</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Intra-household distribution patterns</td>
<td>- Knowledge about food preparation</td>
</tr>
<tr>
<td>Stability</td>
<td>Food availability calendar</td>
<td>Storage: (Storage facility)</td>
<td>- Importance of storage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Storage of total yield</td>
<td>- Knowledge about storage</td>
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<tr>
<td></td>
<td></td>
<td>- Storage for food shortage</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>- Duration of storage</td>
<td></td>
</tr>
</tbody>
</table>
Results

Changes of food security situation

Figure 1 illustrates the average situation of the two sample units now and 5 years ago.

Figure 1: Current food security situation compared to 5 years ago
(on a scale from very bad to very good)

Availability - Yields

Availability of food is analysed by the increase of yields during the last 5 years. Changes of yields perceived by farmers significantly correlate with changes of the overall food security situation ($r_s=0.350^{**}, p=0.003$).

Access - Income

Changes of the income situation correlate highly significantly with changes of the overall food security situation ($r_s=0.573^{**}, p=0.000$). Increased yields ($r_s=0.242^*, p=0.031$) and even more an improved quality of food ($r_s=0.375^{**}, p=0.002$) are linked to an improved income.

As revealed in the group discussions a reason for the changed income situation of the project group is the changed perspective on the markets. The F2M groups learnt to do market surveys, including the collection of information about potential markets, to find marketable crops which achieve better prices and they do collective marketing within the group and within associations.
Results

Utilisation – Quality of food

![Chart: Percentage of farmers that improved the food quality over the last 5 years](image)

Figure 4: Percentage of farmers that improved the food quality over the last 5 years
(Self-assessment of farmers on a scale from very low to very high)

The individual interviews revealed that the improvement within the project group is due to improved seeds and new varieties from different organisations and training on improved farming methods.

Stability – Food availability calendar

Groups discussions revealed, as we can see in Figure 5, that on average there is a significant difference between the F2M groups (5 groups) and the control groups (4 groups) in the availability of food.

![Chart: Food availability calendars of F2M group and control group](image)

Figure 5: Food availability calendars of F2M group and control group
(on a scale from 1=food insecure to 10=food secure)

Changes of food security behaviour

1. Availability - Degree of self-sufficiency

In the following, the change in the degree of self-sufficiency with food, and of how behaviour regarding production influences the food security situation is analysed.

![Chart: Degree of self-sufficiency – Average proportion of food consumption of households](image)

Figure 6: Degree of self-sufficiency – Average proportion of food consumption of households

Observing both sample units together, there is a significant positive correlation of the current food security situation with a higher share of food from own cultivation ($r_s=0.262^*, p=0.026$).
2. **Access - Spending for household food consumption**

Figure 8 shows the share of income used to buy food 5 years ago and now.

![Figure 7: Percentage use of income to purchase food](image)

3. **Utilisation - Composition of food**

The group discussions revealed that there is an improvement of the varieties within the project group. For example during the last 5 years the frequency of eating vegetables also increased, as Figure 9 shows.

![Figure 8: Frequency of eating vegetables](image)

4. **Stability - Quantity of storage**

Figure 10 shows the share of average storage of the total yield of farmers.

![Figure 9: Average storage of total yield](image)

**Constraints to food security**

**Medical conditions**

70 % of each sample unit indicated that diseases within the family are crucial constraints to be more food secure due to less ability to work and high medical expenses.

**Weather Conditions**

For farmers, the term climate change is a synonym for changes in connection with weather conditions. It is used to describe weather fluctuations, the shifting of (planting and harvesting) seasons, heavy rainfall,
drought, storms etc. Through the changes of the season, weather is difficult to predict and crops are affected by heavy rainfall and drought. This can cause harvest shortfalls. Furthermore, planning capacities of farmers for collective marketing are affected.

**Pests and diseases**
Farmers of both groups indicated that pests and diseases are decisive challenges. Control groups indicated a lack of knowledge about how to control pests and diseases as the main reason for a decreasing overall food security situation.

**Availability of land**
Also, the availability of sufficient land, both for food and cash crops, is decisive for farmers and influence the food security situation to a high degree.

**Burden of work for female headed households**
22.5 % (9 statements) within the project group indicated that working alone, without a man or husband, is a further constraint to be more food secure. Within the control group 10 % (2 statements) indicated similar problems. The share of women without man amounts to approx. 35 % in the project group and to 45 % in the control group. They have to care for their children and ensure food security alone.

**Group cohesion**
According to 5 % (2 statements) of the farmers of the project group and 20 % (4 statements) of the farmers of the control group, there is no group cohesion within their groups. Furthermore, there are challenges such as some group members not being very active.

**Market conditions**
Also, the lack of capital to invest and low income were indicated by the farmers, as well as low prices on the markets. Group discussions also revealed that there are low prices on the markets, which causes low incomes. Some groups indicated that currently there is a lack of appropriate markets. There are low prices and price fluctuations. Transport is a problem, when it comes to reach potential markets.

**Lack of knowledge**
Group discussions revealed that within the control group there is a high lack of knowledge, especially on improved farming methods, proper storage, how to control pests and diseases, how to improve soil fertility, how to conserve water and soils, livestock management and how to increase yields. They do not have access to trainings or any other information except the radio or the hospital. Therefore, some failed to cultivate their land properly.

**Lack of planting materials and unfertile soils**
Group discussions revealed that within the control group reasons for the differences between the sample units are found in the lack of planting materials and unfertile soils.

**Summary and Discussion**
The presented results showed that the food security situation of farmers of the F2M project has changed to a high degree. F2M farmers could on average increase their yields, raise their income and improve the quality of their food. Behaviour changes play a decisive role for the changed situation of F2M farmers.

**Behaviour changes**
In particular, results showed that, on average, F2M farmers increased the degree of self-sufficiency though increased yields. The share of land used for food crops, however, did not change. Investigations revealed
that a high degree of self-sufficiency has a positive influence on food security within the scope of the study. F2M farmers increased income and the degree of self-sufficiency at the same time through more efficient land use.

The share of income used to purchase food decreased through increased self-sufficiency. Thus, farmers depend to a lower degree on volatile markets. Additional income is left for purposes such as education, health care, home utilities and to reinvest in agriculture.

Also the food composition changed. For example, farmers eat vegetables, meat, and eggs more frequently and have different crop varieties. Kitchen gardens contribute to a high degree to food security improvements through balanced diets and have a positive impact on health, especially for children.

Additionally, nearly all F2M farmers now have storage facilities and on average they store more in total and for times of food shortages. Also the average duration of storage was prolonged, whereby food availability throughout the year has increased.

The F2M project contributed to these changes to a high degree through awareness and knowledge raising trainings and providing access to improved seeds and different crop varieties. Behaviour changes are influenced and triggered by attitude and knowledge changes, as the results revealed.

**Gender aspect of food security**

Gender aspects are decisive for food security. Observations showed that it is harder to be food secure for female-headed-households. Even if a man is living in the household, female farmers often have to ensure food security alone. On household level, women are still no equal partners, especially regarding intra-household food allocation. Although farmers indicated that their attitude changed regarding the importance of equal distribution within the household, this did not result in any behaviour changes towards an equal distribution of food.

Looking at decision-making patterns, slight improvements were noticeable. The share of households where the man decides alone about cultivation decreased. Gained knowledge by the F2M project enables female farmers to decide more qualified about cultivation. In addition, gender trainings within the F2M project were decisive. Through the F2M project female farmers have better access to income and can therefore decide alone for what to use it.

**Contribution of the F2M project**

Food security is a cross-cutting issue during the F2M project and F2M farmers put strong emphasis on it, although the primary goal is market-orientation. Food security and market-orientation are not necessarily mutually exclusive. Through the F2M project it is possible to combine food security and market-oriented goals. Farmers are able to use land more efficient, supply themselves with enough food, and raised income is left for non-food purposes and further development. The F2M project, using the ERI approach, ensures that farmers participate actively and experience changes by themselves. F2M farmers translate attitude into behaviour through applying knowledge gained by F2M trainings.

Summarising the studies’ findings revealed that the food security situation mainly changed through attitude, knowledge and behaviour changes. The F2M project triggered and supported these changes to a high degree. The improved ability to deal with food security constraints was possible through the F2M
Recommendations

project by giving farmers access to knowledge and improved seeds. But also other organisations working with farmers of the project group contributed to the changes by giving farmers improved seeds and trainings, especially about food utilisation.

There are still constraints to food security, also for F2M farmers, such as sickness, weather fluctuations, pests and diseases, and other hindering factors, such as lack of gender equality, large families and low education, which influence household food security and are still challenging.

Recommendations

Results within the scope of this study showed that a higher degree of self-sufficiency has a positive influence on food security. Therefore, it is recommended to emphasise the aspect of self-sufficiency within the Plan for Modernisation of Agriculture (PMA). Improving food security through food self-sufficiency and markets has to be combined, rather than replaced.

Although there are already strong efforts to strengthen gender issues, more emphasis is necessary to empower women, especially on household level. Cultural traditions and circumstances stand in the way of gender equality. Women have to care for their own nutritional needs, to ensure health and further development. Especially female-headed households have to be supported to manage the additional workload.

Results within the scope of the study verified that knowledge is the key to food security improvements. Educational deficits and knowledge gaps can be overcome through focused trainings. Farmers have to experience changes by themselves and participate actively in trainings. In this way, the ability of farmers to decide what to do and which knowledge to apply improves.

Reducing dependency on external ‘help’ and material inputs is essential to empower farmers. Nevertheless, support such as access to improved seeds is helpful to give farmers an appropriate starting point. Better access to knowledge and improved seeds are highly recommended. In contrast, financial support alone destroys self-responsibility, improves dependency and does not trigger any behaviour change. Therefore, participative approaches, such as the ERI used in the F2M project, which integrate people actively are highly appropriate to change behaviour sustainable and improve the food security situation.

References


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