Impact Assessment on Proli-FaNS (Promoting Local Innovation for food and Nutrition Security) project: Axum Learning Site, Tigray, Northern Ethiopia
Yohannes GebreMichael
July, 2019
# Table of contents

1. Introduction 4  
2. Objectives and methods 4  
3. The action-learning site (Axum, Tigray Region) 5  
4. Profiles of farmer innovators 5  
5. Participatory Innovation Development (PID) 7  
6. Impacts of the project 10  
   6.1 Livelihood diversification 10  
   6.2 Expansion of organic farming 10  
   6.3 Nutrition security and food safety 11  
   6.4 Source of income 12  
   6.5 Addressing the poor, unemployed and landless 12  
   6.6 Formation of self-help groups 13  
   6.7 Agents of change 13  
   6.8 Controlling pest outbreaks 13  
   6.9 Acceleration of graduation from the safety-net programme 14  
   6.10 Stimulating innovation and experimentation 14  
   6.11 Addressing poor women’s needs and priorities 17  
   6.12 Supporting the government policy 18  
7. Institutionalisation and networking 19  
   7.1 Integrating in the extension service 19  
   7.2 Building the foundation for farmer-led joint experimentation 19  
   7.3 Partnership with different institutions 20  
8. Lessons learned 21
Acronyms

AARI Axum Agricultural Research Institute
AGP Agricultural Growth Program
BPA Best Practice Association
CLIC–SR Combining Local Innovative Capacity with Scientific Research
CRGE Climate Resilient Green Economy
DRM Disaster Risk Management
ESM Enebse Sar Mider
FAW fall armyworm
FDRE Federal Democratic Republic of Ethiopia
GIZ German Agency for International Cooperation
GTP Growth and Transformation Plan
IFAD International Fund for Agricultural Development
MTI Ministry of Technology and Innovation
NRM Natural Resource Management
PID Participatory Innovation Development
Proli-FaNS Promoting local innovation for Food and Nutrition Security
Prolinnova Promoting local innovation in ecologically oriented agriculture and NRM

Acknowledgements

I thank the Proli-FaNS project for facilitating the opportunity to learn from the unlimited knowledge and skills of the community. I appreciate also the hospitality of the community and the Prolinnova staff of Ethiopia including BPA.

Both Ann Waters-Bayer and Chesha Wettasinha are always delivering their professional inputs to make a difference in the Prolinnova International Support Team in improving livelihoods in rural Ethiopia.
1. Introduction

The project “Promoting local innovation for Food and Nutrition Security” (Proli-FaNS) has been running for three years and is due to be finalised by the end of July 2019 (1 August 2016 to 31 July 2019).

The overall aim of the project is to empower rural communities in experimentation and innovation for the sustainable assurance of food and nutrition security. Accordingly, the project has been implemented in five African countries in the international Prolinnova (Promoting local innovation in ecologically oriented agriculture and nature resource management) network – Burkina Faso, Cameroon, Ethiopia, Ghana and Kenya. The funding support is from Misereor/Katholische Zentralstelle e.V. (Catholic Central Agency for Development Aid – KZE, Germany) through a grant from the “One World No Hunger” (SEWOH) initiative of the German Federal Ministry for Economic Cooperation and Development (BMZ). In Ethiopia, the project is implemented in two action-learning sites at Enebse Sar Mider (ESM) in the Amhara Region and in the Axum area (Tahtay Maychew) in Tigray Region.

A close look at the strategic plan of the project reveals that it is coined by the principles of holism, integration and sustainability. Moreover, the project is designed to support the Prolinnova network’s long-term programme of promoting local innovation in addressing food and nutrition security. For example, prior to this project, there was a project focusing on Combining Local Innovative Capacity with Scientific Research (CLIC–SR). Hence, the current project provides synergy and added value to the vision of the Prolinnova programme and enhances cost-effectiveness, institutionalisation and sustainability.

Generally, the core activities of the project include: identification and documentation of local innovation, farmer-led experimentation together with partner institutions, training and experience sharing, networking, advocacy, fundraising, and monitoring and learning.

This brief report is a reflection of the process and impact of the project activities in the Axum action-learning area based on a field trip conducted on 21–23 June 2019.

2. Objectives and methods

The overall aim of the study was to understand how the different stakeholders perceived the impact of the project. Accordingly, as an approach, some brainstorming was done with the Axum action-learning site coordinator on the design and schedule. Individual and group discussions were held with the six farmer innovators who are also involved in the Participatory Innovation Development (PID) activities. During the field visit in the Akabe-Se’at Tabia (Ward, the lowest government structure at the grassroots) in Wukro Maray Woreda (District), ten individual farmers (5 male, 5 female) were consulted randomly during the transect walk. Then seven woreda experts, three researchers from the Axum Agricultural Research Institute (AARI), three Axum University researchers and instructors, and two Development Agents (DAs) who were easily available and directly or indirectly involved in the project were consulted face to face or through telephone calls. Observations were also made at the periodic market centre of the district for better understanding of the production and transactions.
3. The action-learning site (Axum, Tigray Region)

The action-learning site is situated in Tahtay Maychew District in Tigray Region in Northern Ethiopia. According to the World Bank Poverty Assessment 2014, around 33% of households in Tigray fall below the poverty line (calculated at 3,781 Ethiopian Birr/annum), making the region the fourth poorest in Ethiopia after Afar, Somali and Gambela Regions. Over the past several decades, the area experienced numerous livelihood challenges that eroded resilience to shocks and led to poverty and malnutrition. Factors contributing to the human and ecological crisis are land degradation, poor land productivity, decline of biodiversity, small landholdings, infestation of pests and diseases, and limited off-farm activities.

The action-learning site lies in a semi-arid agro-ecological zone where drought is recurrent. As for the demographic features, the average family size is about six people with an annual growth of 2.5%. About 30% of the households are female-headed and the average landholding size is 0.5 ha. There is a significant number of youth (female and male) with no access to cultivated land in the locality. The livelihood of farmers is dominantly based on crop cultivation and animal husbandry. However; there is a gradual shift to horticulture and agroforestry with small-scale irrigation and keeping of improved livestock (poultry, small ruminants) and beekeeping. A very limited number of households gain some income from crafts and off-farm activities.

4. Profiles of farmer innovators

An overview of the salient features of the farmer innovators involved in the Proli-FaNS project gives insight into the diversity and complexity and embedded socio-economic and political settings in the equation of innovator and innovation. This also helps to better understand the scope, championship, values and identities of the farmer innovators as partners in joint experimentation. Moreover, by default, it has many implications for food and nutrition security, and for diffusion of new technologies in the community.

- **Joint innovation:** Usually, the innovation at household level is done jointly by the wife and husband. The empowerment of women through the project has unlocked the invisible contribution of women in the joint experimentation at household level. Some innovations are exclusively done by women, such as in food preservation and poultry keeping. Children are also usually involved in the work.

- **Multiple innovations:** As a result of the increased capacity building through the Proli-FaNS project, almost all innovators have more than two and some have up to five innovations without considering the invisible ones. In principle, the project has created an enabling environment for the innovators in dealing with complex and diverse issues in the farming system, which stimulates them to come up with a wide range of innovations rather than specialising in a specific one. As an example of an innovator partner in the project, Mr Gidey Hagos is involved in innovation related to botanicals against pests, domestication of wild plants, chicken feed selection, chicken sex determination through egg shape and beekeeping. Similarly, a female innovator, Ms Brha Tadesse, is involved in innovation related to food preservation, nutrition diversity, poultry improvement, soil fertility improvement and botanical crop protection.
Diversity of livelihoods: Inherently, the Proli-FaNS project is adding value to previous activities under the Prolinnova umbrella in Ethiopia. Accordingly, some of the local initiatives from earlier have been intensified, while some have diffused to a wider scale. Through the project, a range of additional innovative options were identified for improving agricultural production and diversity (related to soil fertility, soil and water conservation, and crop protection), homegardening, agroforestry, poultry keeping, beekeeping and livestock fattening, which have stimulated livelihood diversification at household level. Because the farmer innovators are more engaged in different self-help groups in the community than they were three years ago, they have not only diversified their own sources of livelihood but have also stimulated other members of the self-help groups to diversify, more so than had been happening prior to the Proli-FaNS project.

Better economic status: The documentation of different innovations encourages farmers to do more of their own research and innovation with norms of being hardworking and competitive. The different innovations create avenues to different sources of incomes and are springboards to diversifying farmers’ livelihoods. Accordingly, many farmer innovators could now be classified in the medium- and higher-income categories. During the group discussions, they underlined: “The poor are not us.”

Low-external-input agriculture: The farmer innovators are dominantly involved in improving soil fertility through use of compost, mulch, manure, mixed/intercropping and vermicompost, and they make wide use of botanical treatments to deal with pests and diseases in their field crops, vegetables and fruit trees. Some also use livestock urine to treat livestock diseases. Hence, the farmer innovators are by and large not users of industrial chemicals (pesticides/herbicides) and tend towards organic farming, which is cost-effective and healthy.

Advising and demonstration services: Usually, farmers in the neighbourhood of the innovators are consulting them about issues of crop diseases, access to improved seeds, vegetables and fruits and to join the self-help groups, which develop trust and confidence. Similarly, many farmers from the locality and from other areas visit the plots of the farmer innovators.

Self-help groups: A very unique feature of farmer innovators is their engagement in often more than five grassroots institutions including different self-help groups (commodity- and innovation-based), government structures (different line-office taskforces) and traditional institutions dealing with social, religious and financial matters (known locally as edir, mahber and eqube, respectively).

Table 1: Reflections from farmer innovators

| Ms Brha Tadesse | “The fundamental satisfaction I have with my innovation is that many poor women in our locality are adopting it and improving their livelihoods. Moreover, the community has a big trust and confidence in me and feels responsible to make more impacts.” |

Proli-FaNS impact assessment in Axum, Ethiopia
| Mr Gidey Hagos | “The involvement in the different innovations not only brought me wealth and health; it also stimulated respect and responsibility by the community and the government and agricultural extension.” |
| Mr Abadi Redehey | “My innovation was an avenue to an exchange visit to different parts of Ethiopia and consultation with different stakeholders. It has broadened my horizon of knowledge to make a difference in my family and community.” |
| Mr Gebreyesus Tesfaye | “My innovation in crop protection was simply to solve my personal agricultural problems. I had never expected to be popular at national level to solve farmers’ problems and never assumed my innovation would be a source of income to support my livelihood.” |
| Ms Yibeyn Aseffa | “I think I have done some innovation in pottery for improving nutrition and taste and to save energy and labour. I have made up to four partitions in a single pot. Some of the women in our locality have adopted the innovation but, as a business, it is not encouraging because of the difficulty in finding the clay soil and fuelwood and the demand is minimal unless the innovation is popularised.” |

5. **Participatory Innovation Development (PID)**

The inherent principles of PID are to empower farmer-led experimentation with some added value from other stakeholders including formal research and extension. It also contributes to a paradigm shift from the classical approach of technology transfer, in which formal researchers produce technologies intended for farmers to receive. With the PID practices of joint experimentation under Proli-FaNS, many success stories have been achieved, mainly empowering farmers to experiment and innovate and develop self-confidence to solve their problems while other stakeholders are also stimulated to acknowledge and participate in the joint experiments (Table 2). However, the joint PID activities with staff from AARI and universities in Tigray have some limitations compared with their expected contribution.

- **Joint experimentation:** The PID practice has brought many farmer innovators on board to engage in joint experimentation with each other with some division of labour and sharing of experiences for a synergic effect. However, the involvement of AARI and university staff in the joint experimentation is slow and weak, as this is not strongly
mainstreamed as a core activity of these institutions. Even though community service and technology-transfer sections have been opened up in almost all universities, the limited government budget allocation for research, the limited know-how and the frequent turnover of staff are bottlenecks to mainstreaming PID.

- **Knowledge as power**: Usually, the formal researchers have acknowledged farmers’ innovation and competence to experiment. However, there is some belief among the researchers that any farmer innovation prior to laboratory testing is ‘unscientific’. This mentality implies at least two fundamental issues. Firstly, the formally educated researchers seem very weak in observation of farmers’ field activities in reality and find it difficult to shift from the classical individual station-based laboratory testing to team-based experimentation (adaptive research) in the field. Secondly, it seems they have underestimated that farmers are losing trust and confidence in them while the formal researchers consume too much time for testing and cannot cope with the speed of the farmers’ innovativeness.

- **Appropriate technology**: Usually, under the formal research approach, the ingredients verified in the laboratories are in the framework of standard solutions. For example, to control the fall armyworm (FAW), the farmer innovator (Gebreyesus) uses almost 50 different ingredients, mainly plant materials. AARI is now busy trying to identify the most efficient plants; this process has already consumed more than a year with an IFAD (International Fund for Agricultural Development) grant to work on the FAW. Yet already the PID farmer group members at household level are using different combinations to control the FAW, while the original innovator is proceeding with his nearly 50 ingredients to control FAW and other insects. This also implies that the experimentation by the farmers stimulated them to come up with a range of functional options. The laboratory experimentation does not seem to consider the ongoing dynamics involving local plants, livestock and sociocultural considerations with a range of options rather than a standard solution. The laboratory testing will also change when the inherent intellectual property rights are considered in the equation. A farmer who generates income through his innovation cannot be expected to deliver all his or her secrets to be tested in a laboratory. Not only is the laboratory-based research expensive and time consuming; also the results may be out of date by the time the laboratory reports are released.

In undertaking PID, farmers want quick solutions with minimal expenses. They also inherently believe that, for a single problem, there is a wide range of solutions depending on the locality and households. They also have big trust and confidence in farmer innovation. Hence, any PID partnership out of these norms will not be solid and long-lasting. Moreover, preoccupation with laboratories for a standard solution needs to be reoriented to the local context.
Table 2: PID activities in the Axum action-learning site

<table>
<thead>
<tr>
<th>Focus of experiment</th>
<th>Innovation activities</th>
<th>Actors</th>
<th>Added value</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food preservation</td>
<td>Tomato preservation in powder form and consumed as marmalade</td>
<td>-Farmer innovators, -Agriculture office, -Agricultural research office, -Axum University, -Best Practice Association (BPA)</td>
<td>-Connecting to market as group, -Adjusting production to demand, -Preparing tomato juice</td>
<td>-Widespread among the women as preservation and nutrition support, -Tomato group formed (60 women + 2 men), -Selling tomatoes in group, -In process of setting up regular market centre in the town (Wukro Maray)</td>
</tr>
<tr>
<td>Nutrition/income</td>
<td>Chicken feed Range of feed options for good-quality eggs and meat</td>
<td>-Farmer innovators, -Agriculture office, -Agricultural research office, -Axum University, -BPA</td>
<td>-Free range benefits, -Combination of feeds, -Frequency of feeding</td>
<td>-Feeding packages varies from household to household but red maize is crosscutting and nutritious for food, -Poultry becoming a norm in the locality, -Demand for and price of eggs increasing over time</td>
</tr>
<tr>
<td>Crop protection</td>
<td>Control FAW with botanical pesticide made of more than 50 types of plants</td>
<td>-Farmer innovators, -Agriculture office, -Agricultural research office, -Axum University, -BPA</td>
<td>-Farmer innovators are doing it with different combinations at household level, -Researchers are testing it in a laboratory to reduce the plant number</td>
<td>-The farmer innovator is changing it to a business, -Farmers are using wider range of integrated pest management practices with livestock urine and neem as crosscutting ingredient in combination for different pests</td>
</tr>
<tr>
<td>Energy saving</td>
<td>Flexibility of cooking pot with 2, 3 and 4 partitions in a single pot</td>
<td>-Farmer innovators, -Agriculture office, -Agricultural research office, -Axum University, -BPA</td>
<td>-Market linkages, -Demonstrations, -Adjustments to the overall thickness</td>
<td>-Almost all innovators are shifting from iron to clay cooking pots to test, -Increasing demand with special orders from urban and peri-urban areas, -Yet business not profitable and some are quitting because of shortage of material, labour &amp; fuelwood</td>
</tr>
</tbody>
</table>
6. **Impacts of the project**

6.1 **Livelihood diversification**

Because of the widespread use of chemicals (pesticides and herbicides), traditional beekeeping was in danger in many localities. However, under the Proli-FaNS project, the spreading use of botanical pest control and organic fertility improvement has already led to a reduction in the use of industrial chemicals. This is because some of innovators are organised as beekeeping groups and others at individual level. For example, Mr Gidey has 14 modern beehives with each one producing on average 20 kg of honey. The current honey price in Axum city is 250 Ethiopian Birr (about 10 USD). Therefore, he earns up to 70,000 Birr per year from his beehives only. Moreover, he is engaged in queen rearing and each year he sells on average four beehive colonies at a price of up to 1500 Birr each. Moreover, many of the farmer innovators are organised in self-help groups for beekeeping. The enabling environment created by the innovative farming practices has triggered a wide spread of beekeeping.

![Image of people harvesting honey](image)

**Honey marketing**

6.2 **Expansion of organic farming**

By and large, the local innovations that have intensified and diffused during the Proli-FaNS project are on soil fertility improvement with crop rotation, manure, compost, biogas byproducts, liquid local fertiliser, vermicompost and agroforestry practices. This has contributed to gradual decline in use of artificial fertiliser (urea and DAP). Similarly, the wider range of application of botanical pesticides using animal urine and different combinations of local plants made it possible to prevent and control crop diseases and pests in cereals, vegetables and fruit trees. The use of industrial pesticides and herbicides has therefore declined gradually. The ineffectiveness of the chemicals and their escalating price also led to a reduction in their use. There was a case in one of the small-scale irrigation on the edge of the action-learning site (May Atsbe and May Tige) that the extensive use of artificial fertiliser, pesticides and insecticides polluted the river downstream and contributed to the death of some livestock. Generally, the move to organic farming not only gives access to nutritious and safe food but also lays a foundation for low-external-input and sustainable farming systems.
6.3 Nutrition security and food safety

During the Proli-FaNS project, more than 20 innovations were documented that address crop and food preservation, diversification, livestock husbandry, crop protection, preparing nutritious food, improving soil fertility and energy-saving technologies. This wide range of pro-poor options has contributed to increased land productivity and production and diversification of production for access to nutritious food. The cumulative effect and synergy have also triggered the expansion of homegardening and agroforestry in the community. Similarly, the improved chicken and goat breeds complemented by the option of local feed sources and beekeeping are adding value to the wider range of biodiversity and access to nutritious food from organic products.

Access to nutritious food

“With our shifts from the use of chemical fertilisers and pesticides, we are not only saving on expenses for chemicals but also accessing healthy food for our children and other family members. One can easily differentiate the taste of food (cereals and vegetables) produced under the local practices of soil fertility and botanical pesticides from food produced using the industrial chemicals”, one of the farmer innovators said.

“The rural food habits were confined mainly to constant use of cereal crops and vegetables that were not very popular as they were considered to be poor people’s food. Today, because of the capacity building and diversification of production, it is possible to produce different types of vegetables, fruit trees, chicken meat and eggs for consumption and for sale. Surprisingly enough, the rural women are becoming more sensitive to organic food in their diet than are the women in urban areas, and they use natural fertiliser and integrated pest management. The big credit goes to the farmer innovators who have triggered diversity of production and the health extension agents who have helped diffuse the practices”, said a district nutrition expert.

According to Ms Brha, in her self-help group of 62 members (60 women and 2 men), up to 48% of the poor women had food only once a day and up to 32% had food twice a day. However, today, because of the better access to different sources of livelihoods (from poultry, homegardening, livestock fattening and crop production), almost all have food three times a day and about 50% of them also give snacks to their children before lunch and dinner.
6.4 Source of income

Already many of documented innovations have been serving as a business and source of income for the innovators and others in the community. For example, a normal egg for consumption costs five Birr while, if it is for breeding, it costs ten Birr. From the above-mentioned self-help group of 62 members, 50 of the poor women (81%) are engaged in poultry keeping because of the project, while about 10 of them who already had 3–4 chickens increased up to ten chickens after capacity building and demonstrations. It was similar with vermicompost, which was introduced by BPA and AARI but had not been diffusing among the farmers. The enabling environment created during the Proli-FaNS project through joint experimentation, training, demonstrations and formation of grassroots self-help groups stimulated diffusion of vermicompost production, which is now a source of income for many farmers. The self-help groups producing vermicompost can sell it to AARI for up to 1500 Birr per quintal. Already farmers from Hadush-Adi Village in the Proli-FaNS action-learning site near Axum have sold vermicompost to AARI for almost 40,000 Birr. The botanical pesticides cost up to 150 Birr/litre and the demand is increasing over time within the area, Tigray Region and other regions.

Earning from biodiversity

6.5 Addressing the poor, unemployed and landless

Ms Geznesh Belay, a female household head with three children and living with her old mother, has only a small homegarden in Maysye Ward in the Axum learning site. Since she has no access to cultivated land, she was supporting her children as a daily hired labourer and with some food support from relatives and community members. Fortunately, she lives in the neighbourhood of Ms Brha Tadesse, a farmer innovator, and had a chance to observe the experiment with the sex determination of chicks by egg shape. She got some female eggs and started collecting eggs for home consumption and for sale. Her chicken population increased to more than 25 and she gained more income from selling the eggs and chickens. Gradually, with some savings, she brought a breeding goat from the PID activities on goat breeding and, with goat fattening, she earns still more income. She and her mother have now constructed more rooms for their house, and she is involved in a women’s savings and credit group. She is also planning to have some beehives around her mother’s homegarden and to engage in some petty trade. Geznesh underlined that it was Brha, who was promoted by the Proli-FaNS project as a model innovator, who stimulated her to become visionary and strong and to reach an economically better position.
Livelihood bases for poor and landless people

6.6 Formation of self-help groups

Many of the farmer innovators are focal persons in setting up different self-help groups, mainly for savings and credit. For example, Mr Gidey has formed a group of 12 people for producing vermicompost and a group of eight farmers on beekeeping, while Ms Brha Tadesse has formed a self-help group with 62 members (60 women and two men) on horticulture and poultry. Each member saves up to 20 Birr/month. The self-help groups also sell their products jointly to earn better prices. The self-help groups were set up on the farmer innovators’ own initiative when they were demonstrating their innovations to the community as part of the Proli-FaNS project. Some groups are already in the process of obtaining legal registration as association.

6.7 Agents of change

Generally, the farmer innovators serve as models in the community with their new technologies and their transformation of livelihoods. They are also risk takers: when new technologies are introduced by formal researchers or extension services, the local innovators are the ones checking the pro and cons of these technologies and adapting them accordingly, later to be followed by other farmers. However, they need to be convinced first to accept or adopt any introduced technology. They are the ones who have more courage and confidence than other farmers in their community. Moreover, as they have developed trust in their locality, some farmers with agricultural problems consult the innovators for advice, while others buy the innovators’ products for further diffusion, such as breeding chickens or small ruminants, chick sex determination by egg shape, vermicompost, botanical pesticides and seedlings of improved fruit trees.

6.8 Controlling pest outbreaks

In each ward, early warning committees have been set up by the agricultural office to inform about the drought situation, disease outbreaks and other problems. Usually, at an early stage of disease outbreak in crops or livestock, the committee consults the local farmer innovators and encourages individual farmers with the problem to buy botanical pesticides from the innovators. According to one of the crop protection experts in the agricultural office, such informal practices among the farmers have contributed to minimise the crop and livestock damage, which goes along with a gradual decline in external support with chemicals, which usually arrive very late.
6.9 Acceleration of graduation from the safety-net programme

Under the Ethiopian Government’s “Productive Safety Net Program”, the poor farmers are supported with cash and food for their services in public work, which is meant to prevent them from losing their assets. In order to be able to graduate from this support, they are facilitated to have access to different technologies, credit and capacity building. The experts in the district have underlined that the local farmers’ innovations are by and large pro-poor and make direct and indirect contributions to speeding up graduation from the safety-net programme.

“The farmer innovators have a wide range of innovations including NRM, soil fertility improvement, crop protection, food preservation, improving poultry and goat breeds and saving energy. All packages are pathways to food and nutrition security, where the lives of many poor people have been improved. For example, under the Productive Safety Net Program, the poor are targeted and facilitated to access different opportunities to accelerate their graduation. Hence, the different local innovations are options of alternatives to support and accelerate the graduation of poor farmers from the safety-net programme”, a district agricultural expert said.

6.10 Stimulating innovation and experimentation

Many of the local innovations documented under the Proli-FaNS project are solving local problems and creating an enabling environment for synergy and interface for the creation of new local innovations. Some examples of innovation triggered as a result of the Proli-FaNS project are mentioned below:

- **Experimentation on fruit trees.** Priest Malade is one of the pioneer farmer innovators, already identified during the Indigenous Soil and Water Conservation Project in the late 1990s. He introduced shallow hand-dug wells and self-developed water-lifting technology in his locality. His agroforestry practices with supplementary irrigation have served as demonstration for the region and the country. His innovations have already spread widely in his locality, where agroforestry has become a normal practice rather than an exception and has transformed the livelihoods of many community members. However, pests and diseases have been chronic problems that damage fruit trees and contributed to a decline in incomes and discouraged fruit trees as a business. Nevertheless, with the identification of different crop-protection innovations during the Proli-FaNS project, it became possible to control different types of pests and diseases. Malade was then stimulated to continue his experimentation with fruit trees. Recently, among his old guava trees, he found one tree that has a higher yield and better-tasting fruits and is not easily attacked by birds. He has also grafted improved orange in his agroforestry plot. Already he has planted the seedlings in his expanded plot and has sold seedlings in the community at a price of more than 50 Birr each. The community has developed confidence in the survival rate of the seedlings because of their access to the local crop-protection options identified during the Proli-FaNS project.
Priest Malade busy in expansion of agroforestry

- **The “farmer doctor”**. Very recently, a zonal workshop was organised by the IFAD/Agricultural Growth Program (AGP) project supported by the German Agency for International Cooperation (GIZ) in Axum. Staff from relevant government offices and AARI and more than 60 farmers from different parts of Tigray attended the workshop. Under the cluster approach of the IFAD project on small-scale irrigation, pests and diseases have become a bottleneck to intensification of production. Unfortunately, chemical pesticides were not able to control the different pests including FAW. However, the farmer innovator Gebreyesus Tesfaye, who was identified during the Proli-FaNS project, has come up with a solution to control different pests with his combination of almost 50 different types of plants. The community and AARI staff have acknowledged the effectiveness of his biopesticide in controlling the pests. Accordingly, the farmers attending the workshop called him “farmer doctor” for controlling the FAW.

- **Animal urine marketing**. Gebreyesus Tesfaye, one of the outstanding innovators in the Proli-FaNS project, has used animal urine specifically from goats and camel. He believes that these animals are browsing from different trees and their urine is medicinal. He compares it with honey as a medicine on account of the biodiversity of the bee fodder. Accordingly, he arranged with people living in the lowlands to bring him camel or goat urine and exchange it for the botanical pesticide or for cash payments. Already, because of the demonstrations during the Proli-FaNS project, the innovation is diffusing among the farmers and some are collecting goat and camel urine to use it on their vegetable plots and fruit trees. It seems inevitable that livestock urine marketing will expand and will strengthen the highland–lowland marketing linkages.

- **“Bad days are gone”**. “During my childhood, I use to help my father plough. After his death, I was not motivated to plough because it was not accepted by our culture. But then innovators like Priest Malade and others motivated me highly to exercise my ploughing. Recently I came to know farmer innovators like Ms Brha and Mr Gebreyesus working on new ways of food preparation and crop protection. Over time, the empowerment of farmers, especially women, is being encouraged, and women are becoming stronger and more self-confident, also me. Now, when the first rains come in early June, I am the first to plough and have the early seed to myself and my mother in the village. Many follow after me. As you see, our crop grows better than that of any other farmer. I am also supporting my livelihood with some fruit trees,
poultry and small ruminants thanks to the innovations identified by the different projects. My children are attending school. Thanks go to the eye-opener innovators in our locality who stimulated new ideas and triggered the competition for a better life. Our locality was known for its prolonged drought, disease and pest outbreaks, seasonal labour outmigration and family disintegration. Today, by and large, it becomes history, the bad days are gone, and the poor are very few in our locality.” (Farmer innovator Ms Beriha Fisseha).

Ms Beriha Fisseha

- **Lessons from mismanagement of fruit trees.** Many farmers in the action-learning site in Tahtay Maychew District benefited greatly from fruit trees as a major source of income and food. One of the pioneer innovators who reclaimed a degraded riverbank through agroforestry was Ms Medhin Gereziher. The fruit trees she planted included guava, mango, orange, lemon, papaya, banana, coffee and others. From the fruit trees, she could earn more than 1000 Birr (€30) per week on the periodic markets. Gradually, to get more income, she planted more fruit trees and some grew from fallen fruit seeds. With time, the trees formed a very dense forest with too little sunlight and poor aeration, and her income from fruit declined to almost zero. However, she was encouraged to visit the different agroforestry practices of local farmers that were expanding mainly because of the crop-protection practices identified during the Proli-FaNS project. During these visits, she understood the importance of spacing between the fruit trees and replacing the old trees with new and improved fruit seedlings available from Priest Malade. She then started clearing the old fruit trees and plans to get new seedlings. This also implies the need to continue the farmer-to-farmer exchange visits as a form of peer supervision and added value.

Lower harvest under dense fruit trees
Clearing of old fruit trees

• “The innovation trap”. The group of farmer innovators in the Proli-FaNS project in Table 1 underlined that a farmer who attempts to specialise in a single innovation cannot survive as a farmer with the family. They gave as example Priest Malade, who highly devoted his time and resources in improving his water-lifting technology and travelling to many different workshops and training courses to popularise his technology. Unfortunately, he gave less attention to his farming and all his fruit trees started to dry up. The first wife left with her children to Shire city. He then totally abandoned his farm and engaged in traditional gold-mining on the riverbank, which was not successful. At a certain point in being an innovator, he had developed an attitude of superiority and was less cooperative with the District Administration and DAs. Fortunately, he married a new woman innovator and recovered again to make good progress with his different innovations as indicated above. Similarly, the innovators gave a warning of the probability of a similar trap to Gebreyesus, who seems to be very busy with the 50 plants for his biopesticide and is giving less attention to his farming. Gebreyesus told them that he would heed their comments. The bottom line is that farmer innovation needs to be harmonised with the daily farming practice and social fabric. Partners who are involved in joint experimentation with farmers also need to be time conscious in consideration of the multiple responsibilities of farmers that need to be scheduled together with visits and experiments.

6.11 Addressing poor women’s needs and priorities

Inherently, the Proli-FaNS project is focused on women and gender issues. Accordingly, the different documented innovations and cases of PID are addressing food and nutrition security of the poor in general and of children and women in particular. Several innovations documented (crop protection, NRM, livestock etc) are a contribution of both wife and husband, while other innovations are solely contributed by women innovators (food preservation, chicken breeding and feeding, nutrition). The project has empowered the poor women to experiment and innovate and solve their own problems.
For example, the innovation in determining the sex of chicks to be hatched from eggs and the innovations related to breeding and feed selection have stimulated many poor women household heads to be engaged in poultry keeping. The market demand for eggs and chicken is high. As mentioned earlier, a single egg has a price of five Birr and an egg for breeding up to ten Birr. The price for a mature hen is up to 400 Birr. This activity has helped many women make some savings, form self-help groups, buy improved goat breeds and expand to homegardening and agroforestry. However, the wide spread of pests and diseases in their vegetables, fruits and field crops reduced their income and exposed them to unsafe food because of chemical use, which they were using in small dosages. Fortunately, with the diffusion of the integrated pest management practices embedded in the training, they are becoming better able to control the pest. Similarly, technologies for improving soil fertility, including vermicompost, are also expanding in homegardening. Therefore, the different activities in the Proli-FaNS project, including training, reinforced each other to address food and nutrition security, to help farmers shift to organic farming, and to develop resilience to the impact of climate change.

Joint observations by women’s group

6.12 Supporting the government policy

The current government strategy of Ethiopia called the Growth and Transformation Plan II (GTP II) and the Climate Resilient Green Economy (CRGE) in agrarian areas focuses on overcoming poverty with conservation, biodiversity and appropriate technology in the crop and livestock sector. Similarly, the National Policy and Strategy on Disaster Risk Management (DRM) focuses on minimising the effects of multiple shocks and hazards with enhancement of resilience to the different risks of rural livelihoods, while the National Nutrition Program focuses on reducing chronic undernutrition mainly of malnourished women and children (FDRE 2011, FDRE2016). By and large, the Proli-FaNS project activities with the entry point of local innovation and farmer-led experimentation have addressed soil fertility improvement, crop protection, increasing biodiversity of crops, vegetables and multipurpose trees, improving the livestock sector and enhancing and diversifying nutrition sources with organic foods, and directly supported the government’s agrarian policy in the framework of food and nutrition security.
7. **Institutionalisation and networking**

7.1 **Integrating in the extension service**

“I am proud working in this tabia. The district agricultural office and administration has recognised the tabia as a model where the different farmer innovators have played fundamental roles in homegardening, agroforestry and introducing fuel-saving stoves. Above all with the issues of pests and diseases, the district was not able to control these with chemicals, while the community has controlled them with their botanicals combined with livestock urine. Today, their technology is popularised by media at the district and regional level. The push by the district to use artificial fertilisers and chemicals against pests and weeds has also been declining as the result of the good performance of the local practices for soil fertility management and crop protection. These practices have also triggered the wider spread of beekeeping, access to safe water for human and livestock and more.” (DA from Akabe-Se’t at Tabia)

7.2 **Building the foundation for farmer-led joint experimentation**

The different stakeholders underlined that the Proli-FaNS project was very successful in creating an enabling environment to conduct farmer-led joint experimentation. Many of the partner institutions have clearly acknowledged the competence of farmers to innovate and experiment and the potential added values of joint experimentation with the farmers. However, the process of engaging in joint experimentation had been slow on account of a lack of long-term strategic planning, as indicated by some of the actors quoted below.

“The agricultural research institute has been involved in the verification of pesticidal botanical plants in the laboratory with the overall aim of reducing the combination of 50 botanicals to three or five effective plants, which is an expensive and still time-consuming venture. Moreover, the research institute has also attempted to integrate farmer innovations such as in botanical pest management into the project of IFAD and AGP small-scale irrigation schemes. We have purchased vermicompost and botanical pesticides for about 50,000 Birr, from which more than 20 local farmers have benefitted. However, the institutionalisation of the PID approach is not as strong as expected and needs to be linked with the socio-economic and training department that links research and extension.” (Agronomist from Axum Agricultural Research Institute)

“Our university has been highly motivated with the farmer innovation and PID exercises, mainly on soil fertility management including vermicompost, use of biogas byproducts (bioslurry) and liquid fertiliser. Accordingly, we have set up a taskforce on integrated soil fertility management from different disciplines of horticulture, soil science, plant science, agricultural economics and nutrition to work with the farmer innovators. The process is very slow, yet there are some opportunities to write a proposal and get some funds from the university.” (Researcher/instructor from Axum University)

“During the Proli-FaNS project, we had very strong connections with the farmer innovators and frequently visited them with our students when we had a strong focal person in the university. Unfortunately, when that person moved to another place, the motivation for the partnership slowed down.” (Researcher/instructor from Axum University)
“Prior to our involvement in the PID exercise during the Proli-FaNS project, we had a memorandum of understanding signed with Axum University and BPA. Accordingly, our team was involved in improving chicken feed. Usually, up to 70% of the chicken feed is imported from outside the locality and we advise the farmer innovators with a list of potential local feed sources and farmers also add other potential sources. Unfortunately, the focal person assigned to follow up moved abroad for further study and the follow-up of the results was not done.”
(Researcher/instructor from Axum University)

Despite the acknowledgement of farmer innovation, the commitment to joint experimentation and institutionalisation in the university is slow. This demands at least two fundamental interventions. Firstly, more awareness is needed on the conceptual clarity of local innovation and PID among the university staff to stimulate a shift from a single focal person to a centre such as the research and community service in the university and to integrate the approach in the different courses of the university. Secondly, to assure strong partnership and ownership, the university needs to be involved in the process of jointly writing the project proposal.

7.3 Partnership with different institutions

During the Proli-FaNS project, economic affiliated grassroots institutions have been developed and the linkages of the farmer innovators with different governmental and nongovernmental institutions have been intensified and expanded. Prior to the project, there were ad hoc linkages with different institutions, but the more formal linkages and the self-help groups formed by farmer innovators during the project helped in synergy for added values, acceleration of institutionalisation and sustainability of the Prolinnova principles and core activities. Based on the outcome of the group discussions with farmer innovators, their institutional linkages are shown in Figure.1. The farmer innovator groups have a very close or overlapping partnership with the grassroots self-help groups on beekeeping, home gardening and vermicompost, as the innovators are serving as focal persons in each group. Similarly, the early warning committee at ward level is working closely with the farmer innovators on issues of pest or disease outbreaks because of the farmers’ knowledge and skills in crop protection. The other close partners in the second circle are the Agricultural Office, AARI, Axum University and BPA, which are closely involved in the PID activities, while the Ministry of Technology and Innovation (MTI) and the Farmers Association are encouraging the wide spreading of the best local innovations. Other institutions with direct and indirect connections but at a relatively far distance are the Youth Association, Women’s Affairs, and education and microfinance institutions.

The innovator groups are now in the process of registration as innovation and commodity-based associations. This legal registration will strengthen the partnership and networking modalities, improve the quality of farmers’ products and bargaining power, and make their voices heard.
8. **Lessons learned**

From the very brief field study, the major lessons learned are:

By and large, the Proli-FaNS project is very successful in improving land productivity and production, enhanced resilience to shock, and improved food, nutrition and livelihood security among the poor and landless. Moreover, it empowers farmers to experiment and innovate to solve their problems.

The other fundamental success of the project was that the pro-poor innovations identified have triggered and developed confidence within the farming communities in diversifying their livelihoods and have made local innovation a norm, and have also enabled savings, mainly by the poorer women.
The innovators as champions are not only transforming their economic status but also serving the wider community, where the dependency on safety-net relief has declined in the project areas and surroundings.

During the project cycle, partnership and networking with different grassroots and governmental and nongovernmental institutions have been intensified and are expanding, which is serving as a springboard to the wider spreading of good practices and to institutionalisation and sustainability of the Prolinnova principles and core activities among the partner organisations. No doubt with the strengthening of long-term strategic partnership planning among the research and higher institutions, the added value from joint experimentation will be achieved.