

## **Collaboration between farmer innovators and formal scientists in Participatory Innovation Development (PID)**



*Innovator Benigna Muumbua explaining her organic fruit-fly trap to members of the Makueni Local Steering Committee  
(Photo: Chesha Wettasinha)*

### **Cases from five Country Platforms in the Proli-FaNS (Promoting local innovation for food and nutrition security) project**

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## Table of contents

	<i>page</i>
List of acronyms	ii
Acknowledgements	iii
Chapter 1: Farmer–scientist interaction in farmer-led joint research <i>by Ann Waters-Bayer, Brigid Letty and Chesha Wettasinha</i>	1
Chapter 2: Joint research on the locally developed <i>goama</i> biopesticide in Burkina Faso <i>by Siaka Bangali, Do Christophe Ouattara and Abdoulaye Sanfo</i>	5
Chapter 3: Collaboration between an innovative farming couple and formal researchers in Cameroon to reduce the bitterness of chocolate <i>by Jean Bosco Etoa</i>	10
Chapter 4: Farmer–scientist interaction to control fall armyworm in Ethiopia <i>by Beza Kifle and Yohannes Gebre Michael</i>	14
Chapter 5: Women-led joint experimentation on a local innovation in <i>wasawasa</i> food preparation in Ghana <i>by Gladys Gamor, Naomi Zaato and Joseph Nchor</i>	17
Chapter 6: Two cases of collaboration by farmer innovators and scientists in Kenya <i>by Vincent Mariadho and Makonge Righa</i>	24
Chapter 7: What have we learnt from these PID cases? <i>by Brigid Letty, Georges Djohy, Joseph Nchor, Ann Waters-Bayer and Chesha Wettasinha</i>	30

## ***List of acronyms***

ACDEP	Association of Church-based Development Projects
ACEFA	<i>Améliorer la Compétitivité des Exploitations FamilialesAgropastorales</i> (Improving the Competitiveness of Agropastoral Family Farms)
AKNGS	KoumbiNaam Association of Gomponsom for the Sahel
ARD	agricultural research and development
BPA	Best Practice Association
CP	Country Platform
EPDRA	Evangelical Presbyterian Development and Relief Agency
FAW	fall armyworm
KALRO	Kenya Agricultural and Livestock Research Organization
LSC	Local Steering Committee
M&E	monitoring and evaluation
MDoA	Municipal Department of Agriculture
MSP	multistakeholder platform
NGO	nongovernmental organisation
NRM	natural resource management
NSC	National Steering Committee
PID	participatory innovation development
Proli-FaNS	Promoting local innovation for Food and Nutrition Security
Prolinnova	Promoting local innovation in ecologically oriented agriculture and NRM
SEWOH	<i>SonderinitiativeEine Welt Ohne Hunger</i> (Special Initiative One World No Hunger)
UDS	University for Development Studies
WIAD	Women in Agricultural Development

***Prolinnovacopyleft proviso:*** *Anyone may use the innovation described here and modify or develop it further, provided that the modified or further developed innovation or any follow-up innovation, of which the innovation described here is an element, is likewise freely available and includes this proviso.*

## ***Acknowledgements***

We would like to thank – first and foremost – the farmer innovators and other community members and the field-based staff of the partner organisations and individuals in the Prolinnova<sup>1</sup> Country Platforms in Burkina Faso, Cameroon, Ethiopia, Ghana and Kenya, for leading and facilitating the processes of farmer-led joint research that are described in this booklet. The authors of the different cases contributed a great deal of time and thought in documenting and analysing the experiences and revising their chapters several times in response to comments from others in the team. As the organisation that coordinated the “Promoting local innovation in Food and Nutrition Security” (Proli-FaNS) project activities in the five countries, the Association of Church-based Development Projects (ACDEP) in northern Ghana deserves a very special mention.

We are also grateful for the funding support that the Prolinnova international network (via ACDEP) received from Misereor/KZE (*KatholischeZentralstelle* / Catholic Central Agency for Development Aid) as part of the “One World No Hunger” (SEWOH) initiative of the German Federal Ministry for Economic Cooperation and Development (BMZ). We offer particular thanks to Sabine Dorlöchter-Sulser for the encouragement and thoughtful advice she gave and continues to give to the Prolinnova network. Her keen interest in collaboration between small-scale farmers and formal researchers inspired us to give special attention to this in a booklet.

## ***Dedication***

We dedicate this publication to the Ethiopian specialist in agricultural innovation, Amanuel Assefa (1961–2019), who passed away suddenly in December 2019. Amanuel was the driving force in setting up the Prolinnova multistakeholder platform in Ethiopia and was the first coordinator of that platform. He played a key role in building up the international Prolinnova network, including serving as a member of the Prolinnova Oversight Group (POG). He organised the first international workshop of Prolinnova partners, held in March 2004 at the Furra Institute of Development Studies in Yirgalem, Southern Ethiopia. In 2016, he led the process of developing the proposal for the “Promoting local innovation in Food and Nutrition Security (Proli-FaNS) project, on which this publication is based. He also became the first Subregional Coordinator for Prolinnova in Eastern & Southern Africa. Amanuel was passionate about facilitating networking, sharing and joint learning and keenly pursued the network’s aim of mainstreaming participatory innovation development (PID) into governmental and nongovernmental organisations and institutions of research, development and higher learning.

***– The editors***

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<sup>1</sup>Prolinnova is an NGO-initiated international multistakeholder network that promotes local innovation processes in ecologically oriented agriculture and natural resource management. It focuses on recognising the dynamics of indigenous knowledge and enhancing capacities of farmers (including pastoralists, artisanal fishers and forest dwellers) to adapt to change – to develop their own site-appropriate systems and institutions to manage resources so as to gain food security, sustain their livelihoods and safeguard the environment (see [www.prolinnova.net](http://www.prolinnova.net)).

# Chapter 1

## Farmer–scientist interaction in farmer-led joint research

*by Ann Waters-Bayer, BrigidLetty and CheshaWettasinha*

### Local innovation and farmer-led joint research

For many years, the members of the Prolinnova network have been promoting farmer-led innovation and participatory research and development. The approach starts with identifying local innovations – new and better ways of doing things – developed by small-scale farmers to find solutions to their challenges and problems, to seize new opportunities and thus to improve their local farming and land-use systems and their livelihoods. The farming systems are seen in a wide sense to include management of inputs and products and their processing and marketing.

The network members appreciate the immense creativity of small-scale farmers and work with the hypothesis that local innovation processes can be intensified and accelerated when diverse actors in agricultural research and development (ARD) holding different types of knowledge come together in the spirit of joint learning based on mutual respect, regardless of their level of academic education. These actors include men and women farmers, agricultural and rural advisors, research scientists, educators in universities and colleges, traders and other people in the commercial sector such as agricultural service providers.

Recognising local innovation is not primarily an activity to discover new technologies that can be transferred to other farmers. Rather, it serves as an entry point to the joint learning by farmers and other actors about the local innovations and how they can be improved, as well as about the process of local innovation and how it can be improved. The Prolinnova network refers to the art of coordinating and facilitating this concerted action as “participatory innovation development” (PID) or “farmer-led joint research”. One of the purposes of facilitating PID is to improve interactions between small-scale farmers and other knowledge holders so that ARD is driven by the farmers and benefits them and their communities. The ultimate aim is to enhance the local capacity to innovate – and thus to adapt to new challenges and opportunities.

This work is being carried out within a context of ARD that still operates primarily according to a transfer-of-technology approach, with new technologies developed by scientists and other external experts and then passed on through various intermediaries to farmers who are expected to adopt the introduced “innovations”. However, small-scale farmers’ uptake of these technologies has often been poor, as many are not appropriate for the contexts in which the farmers operate. The Prolinnova network would therefore not refer to these technologies as “innovations”. Instead, it regards innovation as the successful application of new ideas to bring new economic and social benefits for the local people without jeopardising the environment.

The network tries to show the value of an alternative approach to ARD – an approach that starts with valuing the assets at community level, especially small-scale farmers’ creativity in their own efforts to experiment and innovate in order to deal with new problems or opportunities. This approach consists of stimulating ARD actors, including small-scale farmers themselves, to recognise local innovation processes and the outcomes of these processes and to encourage actors in agricultural research, development, advisory services and education to support farmers’ initiatives in ways that strengthen local capacity to innovate and adapt.

The PID process pursues answers to the questions of farmer innovators and other local community members who seek support from other actors with specialised expertise to further develop a local innovation or sometimes simply to allay any local concerns about the health or environmental impacts of the innovation. Over the years, there have been good experiences of farmers engaging in experimentation within farmer research groups, sometimes with the assistance of specialised staff members from state or non-state agricultural advisory services. Occasionally, there have been cases of interaction with staff from agricultural research stations, universities and colleges, some of which were documented in the booklet *Farmer-led joint research* (2010)<sup>2</sup>. However, this type of farmer–scientist interaction has continued to be relatively rare.

### **The Proli-FaNS project**

In 2016, the Prolinnovanetwork was given the opportunity to develop a project to encourage interaction between farmer innovators and scientists working on issues of food and nutrition security. This opportunity came through the development-support NGO Misereor (German Catholic Bishops' Organisation for Development Cooperation) based in Aachen, Germany, which had received a grant from the “One World No Hunger” (SEWOH) initiative of the German Federal Ministry for Economic Cooperation and Development (BMZ). The late AmanuelAssefa from Prolinnova–Ethiopia took the lead in formulating the proposal on behalf of all the Prolinnova Country Platforms (CPs) in countries eligible under SEWOH. The proposal was based on a joint analysis of past experiences by members of several Prolinnova CPs in Africa (as the grant was only for countries in Africa) as well as on the entire network’s strategic plan for 2016–20<sup>3</sup>, which had been a collective effort of the Prolinnova community of practice involving CPs in Africa, Asia and the Andes.

When the project “Promoting local innovation for Food and Nutrition Security” (Proli-FaNS) was being developed, the participating CPs highlighted a key challenge in their previous work: involving research scientists meaningfully in farmer-led joint research. The network seeks to promote wider application of this approach in agricultural research institutions, but there were still too few concrete examples of farmer-led research in close interaction with formal scientists and too little good documentation of this. The partners in Prolinnova also saw a necessity to analyse their experiences with this approach, to learn what pitfalls to avoid and how to do so, and also to gain deeper insight into how formal researchers could be attracted and motivated to support farmer-led initiatives.

The self-evaluation had also revealed that insufficient attention had been given in the past to rural women’s innovation and experimentation and to supporting participatory research led by women. The Prolinnova partners therefore wanted to give special attention to this in the new project, related not only to food production but also to processing and marketing of agricultural products.

Later in the year, Misereor/*KatholischeZentralstelle*(KZE; Catholic Central Agency for Development Aid) gave the go-ahead for the three-year Proli-FaNS project, which started in August 2016 and was coordinated by the nongovernmental organisation (NGO) Association of Church-based Development Projects (ACDEP) based in Tamale in northern Ghana. The on-the-ground activities with men and women farmer innovators and supporting organisations were carried out in eight “action-learning sites” in five countries: one site each in Burkina Faso and Cameroon and two sites each in Ethiopia, Ghana and Kenya. At the same time, in line with the Prolinnova strategic plan for regionalisation of the network, activities were supported to strengthen networking and policy dialogue in two subregional platforms in West and Central Africa and in Eastern and Southern Africa, respectively.

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<sup>2</sup> See pdf version at <http://www.prolinnova.net/publications/publications> under the year 2010

<sup>3</sup> See <http://www.prolinnova.net/content/about-prolinnova>

The Proli-FaNS project sought to achieve the following objectives:

- i. Rural communities develop their innovative capacities to effectively improve food security, nutrition security and nutritional diversity;
- ii. Women are more widely recognised as innovators and are supported in further developing their innovations, from which they control the benefits; and
- iii. Subregional Prolinnova platforms support CPs to develop capacity for collective learning, mobilising resources and effective policy dialogue.

The entry points for the on-the-ground activities were to be local innovations primarily by rural women. The partners in the five CPs facilitated participatory research to improve innovations related to food and nutrition security that had been identified and prioritised together with both men and women farmers, including women's groups and mixed-gender groups. The partners moderated the interaction between the farmer innovators and external specialists from research centres or universities to respond to the questions of the farmers and other community members and to analyse and validate the PID results to the satisfaction of both the farming communities and the scientists. This was meant to generate strong evidence to convince not only other farmers but also scientists and academics about the merits of local innovation and PID.

The CPs formed multistakeholder platforms (MSPs) in each of the action-learning sites to engage various local stakeholders such as farmers' and women's groups or organisations, traditional leaders, local government authorities, rural advisors and scientists in local or nearby research stations. This was a very deliberate strategy to stimulate joint learning about institutionalising the PID approach. The MSPs were involved in coordinating the collaboration of farming community members and other local stakeholders in planning, implementing and evaluating the farmer-led joint research. The functioning of the MSPs led to stronger relationships between farmer innovators, local scientists, agricultural advisors and other development agents in their joint exploration of how to improve local farming and livelihoods.

### **Joint learning through documentation**

An important role of the Prolinnova network is facilitation of joint learning through analysis and documentation of the experiences made, thereby identifying good practice but also recognising weaknesses and room for improvement. The documentation is shared with others within the network and beyond, who can be inspired to try to do something similar or better by adapting the approach, based on the lessons learnt. In this way, the network's activities can have a wider and more positive impact.

Each of the five CPs involved in on-the-ground activities in the Proli-FaNS project selected one or two cases of interaction between farmer innovators and scientists in PID as sources of learning. In the following five chapters, Prolinnova partners in the five countries describe and analyse their experiences in facilitating farmer-led joint research on: i) a locally developed pesticide in Burkina Faso; ii) reducing bitterness in locally processed chocolate in Cameroon; iii) controlling the fall armyworm in Ethiopia; iv) improving a traditional dish in Ghana; and v) hanging gardens for land-scarce households and an organic fruit-fly trap in Kenya. In most cases, these PID cases were based on innovations developed by women or to which women had contributed strongly – as individuals, in a women's group, as wife in a couple working together. In one of the PID cases, a male farmer had developed the local innovation – and this choice of case by the CP reflects the difficulty encountered in that country (Ethiopia) to work with rural women in PID.

The six cases of PID (including two from Kenya) are not necessarily “exemplary” cases in the sense of showing how “perfect” PID is done. Rather, these are cases from which the CPs have drawn

important lessons for improving how they go further in promoting farmer-led joint research. The interaction of some scientists with the farmer innovators was not always as close and frequent as the farmers (and the other CP members) may have hoped. The question arises as to why this is so, in countries that have – in some cases – been trying to promote PID for over a decade. The discussion in the closing chapter takes up this theme.

### **Incorporating lessons from PID into policy dialogue**

The documentation provides evidence of small-scale farmers' capabilities to innovate and to engage in research and their contribution to improving food and nutrition security and rural livelihoods. It is meant to attract greater "buy-in" for the PID approach as a means to achieve these rural development aims. During the Proli-FaNS project, several PID cases were documented by each of the CPs: four cases in Cameroon and five in Burkina Faso (both of which had one learning site) and six in Ethiopia, eight in Ghana and eleven in Kenya (all of which had two learning sites). Documentation of all these PID processes and outcomes is being used in policy dialogue to encourage governmental institutions of ARD as well as development NGOs to incorporate the PID approach into their day-to-day work. In the selection of PID cases presented in this booklet, an attempt was made to delve deeper into the roles of the different actors and to reflect on the social and institutional impacts of the experience.

The first steps toward institutionalising the PID approach started, however, long before the documentation. Forming MSPs at each action-learning site helped raise the interest of the various local stakeholders in farmer innovation and the PID approach. As a result of their personal experience in PID, some MSP members started to mainstream this approach into their own work even before the process and lessons had been documented. Personal experience is the greatest source of learning and conviction, but the documentation of the on-the ground PID experiences is meant to provide evidence for wider-reaching policy influence aimed at making agricultural research more farmer-led and more useful for small-scale farmers. The documents will hopefully also raise the interest of development workers to try out PID as an approach within rural advisory services – encouraging farmers to experiment with new ideas and to adapt these to the local conditions and circumstances.

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## Chapter 2

### Farmer-led joint research on the locally developed *goamabiopesticide* in Burkina Faso

*by Siaka Bangali, Diobass Burkina; Do Christophe Ouattara, World Neighbors; and Abdoulaye Sanfo, KoumbiNaam Association of Gomponsom for the Sahel (AKNGS)*

#### The innovators and their innovation

A group of women in Gomponsom in Passoré Province in northern Burkina Faso, who grow vegetables for home and for the market, faced a problem with various pests such as spiders, caterpillars, moths and grasshoppers in their tomato, onion, cabbage, cowpea and eggplant plots. Gomponsom is an area where several other women grow vegetables and likewise suffer from pest damage. Chemical pesticides are locally available but costly, and the women fear that the chemicals may be toxic not only to the pests but also to themselves as producers and to their families and customers who eat the vegetables. Moreover, they thought that the chemicals might lower the nutritional quality of the vegetables. They therefore sought a non-chemical solution. Although each woman has her own garden, five women decided to work together as a group to tackle the pest problem. The women's names are Belem Mariam, Sawadogo Azéto, Rabo Fati, Zoundi Mamounata and Sankara Asséta, they range from about 20 to 55 years of age, and all of them are married.

They did their own experimentation to find a solution to their problem. They eventually came up with a natural pesticide, using the bark and roots of various locally available plants, which they found to be effective in controlling the pests. They call their biopesticide "*goama*" in the Mooré language, which means "fighting the attacking enemies". They say that using *goama* helps them increase their incomes from their gardens and leads to better food and nutrition security for their families and their customers. Also some other vegetable farmers in the area had learnt from the women about this biopesticide and are now gaining similar benefits.



*Women farmers' action-research group that developed the goamabiopesticide  
(Photo: Diobass Burkina)*

## Selection of the local innovation for PID

In the framework of the Proli-FaNS project, the NGO Diobass Burkina and the farmer organisation KoumbiNaam Association of Gomponsom for the Sahel (AKNGS) jointly analysed the local innovations that had been identified in the action-learning site and selected the *goamabiopesticide* as a case for farmer-led joint research. The main criteria for selecting cases for PID were: i) originality of the innovation, ii) its apparent effectiveness, iii) its relevance to solve a problem in the local community, iv) the likelihood that it could be applied also in other communities, v) local availability of the raw materials, vi) positive group dynamics among the farmer innovators, and vii) involvement of women. It was also important that the innovators were prepared to share the results of their research with other farmers.

## Objectives of the PID

The main objective of the joint research was to validate the local innovation and thus reinforce the knowledge of the farmer innovators. The women hoped that, through this process, they could gain assurance that the *goamabiopesticide* was indeed effective, economical and healthy for themselves, their families, their customers and the environment.

## Actors and roles in the PID process

The process of joint research on *goama* involved various actors: the farmer innovators, the farmer organisation AKNGS, field staff of Diobass, governmental technical advisors at departmental and district level, and scientists from the University of Ouagadougou 1 (Life & Earth Sciences) and the National Institute of Environment and Agricultural Research (INERA) specialised in horticulture and pest management.

The **women innovators** came up with the initial ideas and led the joint experimentation and sharing of the results. Also the women's family members (husbands, sons and daughters) took part in the joint research by providing advice and support, such as labour. Members of their extended families likewise gave the women useful comments on their research and informed others in the community about the results.

The **farmer organisation** AKNGS is the local host of the PID work. It was involved in identifying and selecting local innovations, helping the farmers set up an action-research group, identifying the site for joint experimentation, facilitating the participation of other actors in the experiments, monitoring and supervising the experiments led by the action-research group (AKNGS assigned a facilitator for this purpose) and supporting dissemination of the local innovations. It also shared information about the PID approach in which members of its organisation were involved.

The **NGO** DiobassBurkina coordinates the Proli-FaNS project in Burkina Faso on behalf of the CP under the umbrella of the ProInnova network. It took up contact with the various actors in order to convince them to collaborate in identifying local innovations and innovators, characterising the innovations and assessing their added value.

After the *goamabiopesticide* had been selected as a topic for PID, the NGO facilitated the interaction of the women farmers, the technical advisors and the scientists in the joint research so that the external actors could bring in their knowledge about life cycles of insect pests in vegetable gardening and ways of combatting them, thus reinforcing the women's abilities to improve their local innovation. Diobass later organised workshops so that the various actors involved could reflect on the process and results of the joint research.

The **technical advisory services** of the government collaborated with the farmers and scientists in drafting the research protocol and were later active in spreading the findings about the biopesticide to encourage other farmers to try it out.

The **scientists** from the university and research institute made a literature review on vegetable diseases and their mode of infection, agents and vectors. Together with the technical advisors, they helped the women gardeners draft the research protocol and monitor and evaluate the results of the research, including joint development of indicators to monitor. Through their laboratory analyses, they provided scientific validation of the effectiveness of the biopesticide.

### Conducting the trials

With the support of Diobass and AKNGS, the women farmers had formed an action-research group. Diobass and the scientists facilitated the process of eliciting and formulating the research questions of the women gardeners. In essence, the women wanted to find out exactly how much of different and partly new components of leaves, twigs, bark and roots was needed to make the *goamabiopesticide* most effective. They were also interested in knowing the effect of *goama* on the nutritional quality and healthiness of the vegetables.

The women gardeners, the technical advisors, the formal scientists and Diobass identified the equipment, inputs and other materials needed for the PID, such as sprayers and containers for the biopesticide and protective clothing for the women. Diobass then purchased these, using funds from the Proli-FaNS project, and provided them to the women and other partners in the CP who were involved in the joint research. However, most of the materials needed were locally available and were collected by the women, such as neem seeds, leaves of *Cassia nigricans* (*zandrekouka* in Mooré), leaves and flowers of basil (*gnounougouga* in Mooré) and water.

After joint design of the research protocol with the women, Diobass and the scientists gave them some training in farmer-led action research and how to implement research protocols, and also coordinated development of tools to record and monitor the research and to measure the results.

The women's market-gardening group conducted the trials in their vegetable plots over three cropping years (2016–18), with support from Diobass field staff and researchers from the University of Ouagadougou. These trials involved exploring different mixtures of ingredients also from leaves and twigs for new formulations of the *goamabiopesticide* that had initially been prepared as a local innovation from only bark and roots.

The results of the trials were fed back to other community members so as to encourage them to try out the innovations themselves and also to introduce the approach of promoting local innovation and farmer-led joint research to a larger number of farmers and other stakeholders in ARD.

The *goamabiopesticide* was thus further developed over several years of experimentation by the women to find out which raw materials and dosages would work best in controlling pests in organic gardening and crop production. Their biopesticide was analysed in the laboratory of the *Institut de Recherche en Sciences Appliquées et Technologies* (IRSAT, Institute of Research in Applied Sciences and Technologies) in Burkina Faso.

### Results obtained

As a result of this joint research in the women's gardens, the effectiveness of the *goamabiopesticide* could be validated both by the local people and by the scientists. The laboratory analyses revealed to the women that their *goamabiopesticide* was indeed effective in controlling insects that were

attacking their vegetables. The scientists also assured the women that use of *goamadid* not appear to have any negative impacts on the environment.

The actors involved in the PID concluded that the *goamabiopesticide* led to better quality of the harvests from the vegetable plots, higher incomes from organic vegetable production and improved health and nutrition of the farm families and other consumers of the vegetables.

### Sharing the experience and the results

The PID experience and results were shared with other members of the AKNGS farmer organisation; other staff of the technical advisory services and of the projects and producers of the Toécé Dam in the provinces of Zondoma, Passoré and Yatenga; Diobass; the national and local MSPs in Burkina Faso; and the local administrators and communities in Gomponsom Department and elsewhere in Passoré Province as well as the Godyr Department in Sanguié Province. This was done through knowledge fairs, tomato fairs, National Farmers Day, experience-sharing visits, reflection sessions in workshops, and multistakeholder workshops to share and discuss the results of the PID and to plan how to disseminate the results and the approach more widely.



*Presentation of innovations at fair organised by Proli-FaNS Burkina in July 2018 in Gourcy (Photos: Diobass Burkina)*

### Main lessons learnt

In the implementation of the PID, positive results were achieved when the roles and knowledge of the actors were complementary, leading to a synergy in the interaction. However, thus far, it has proved difficult to mobilise many university staff members and other scientists to engage in PID. Involving them can be costly, because many of these actors regard themselves as service providers who should be paid high fees. Moreover, most technical advisors in the government services are still hesitant about integrating the local innovations into their regular extension work. Much more work needs to be done to engage scientists and extensionists in farmer-led PID.

The focus on local innovation and farmer-led research leads to social recognition of innovator groups and the partner organisations engaged in the PID. Although the innovators were not paid for their hard work and sacrifice of their time in the farmer-led research, they did gain higher yields and better quality of vegetables, improved health and nutrition of their families, and higher incomes from selling their organic products.

The vegetable gardeners pointed out that they must apply the biopesticide several times in a growing season to ensure that it works. This is demanding in terms of labour inputs and time. The gardeners are therefore interested in finding out how to optimise the dosage and number of treatments for effective pest control. This would be the next question to explore in PID.

With respect to environmental aspects, it appears that the efficacy and wider recognition of *goama* leads to greater appreciation of the value of the local trees and interest in having access to the tree products to be able to produce the biopesticide. This should encourage efforts to maintain local plant biodiversity, e.g. through giving attention to natural regeneration of the useful trees. On the other hand, higher demand for the raw materials for the biopesticide may lead to decreasing availability of these trees – a reduction that may be exacerbated by the effects of climate change. The farming community and scientists will therefore need to monitor changes in this regard and, if necessary, encourage specific regeneration of the plants needed for the biopesticide.

## **Acknowledgements**

We thank all the women farmers in the action-research group in Gomponsom for their initiative in innovation and experimentation and for their readiness to let other stakeholders participate in their research. We also appreciate the collaboration of the government technical services and universities with Diobass Burkina and AKNGS in facilitating the joint research with the women's group. Other members of the CP in Burkina Faso and the Subregional Coordinator and other members of the Prolinnova IST also provided support, especially in the analysis and documentation of the PID process. The funding from Misereor/KZE for Proli-FaNS is gratefully acknowledged.

## Chapter 3

### Collaboration between an innovative farming couple and formal researchers in Cameroon to reduce the bitterness of chocolate

by Jean Bosco Etoa, Prolinnova–Cameroon coordinator, COSADER<sup>4</sup>

The local innovation in the use of *kanwa* (natron) to reduce the bitterness of cocoa oil cake offered an opportunity for sharing of ideas and cooperation between different actors in development-oriented agricultural research.

#### The innovators and their innovation

Mr Valery EkaniNkoah is a cocoa farmer in Fegmimbang Village, Okola Sub-Division in Lekie Division of the Centre Region, which lies to the north of Yaoundé, the capital city of Cameroon. For his family, as for many other small-scale farmers in the area, cocoa production is important for income generation to contribute to household food security and the children's education.

In 2002, Ekani took part in a training course offered by the Ministry of Commerce on cocoa butter extraction. He developed the ambition to process his cocoa beans locally, as he thought that selling the unprocessed cocoa beans would not bring in enough income to ensure his family's food security. He and his wife Elise dream of setting up a small-scale cocoa processing unit, but cannot afford to invest in this. For the time being, they use Elise's kitchen utensils to process the cocoa into chocolate.

When Ekani asked his neighbours to taste the chocolate, they told him that it still had the bitter flavour of the cocoa beans. Ekani made several attempts to deal with this, e.g. by adding milk, sugar and vanilla, but the feedback from the chocolate tasters remained the same. Then his wife suggested that they try *kanwa*, which local women traditionally use to reduce bitterness when cooking *ndole* (*Vernonia* sp) leaves. When the Ekani couple tried this, the neighbours who tasted the chocolate said that it was less bitter than before.

#### Selection of innovation for research collaboration

During a meeting of the Common Initiative Group (*GIC: Grouped Initiative Commune*) called EVAC Atobonnam, which Ekani had joined in 2016, Bertrand Ntankeu, an advisor in Okola Sub-Division with the programme "Improving the Competitiveness of Agropastoral Family Farms" (*ACEFA: Améliorer la Compétitivité des Exploitations Familiales Agropastorales*), became aware of this local innovation and informed the Nkométou MSP about it. This local MSP had been set up by Prolinnova–Cameroon under the Proli-FaNS project to identify local innovations and facilitate farmer-led joint research and development. Some of the MSP members visited the Ekani couple and invited the husband to present the local innovation during an MSP meeting in Nkométou in July 2017.

This meeting was attended by MSP members from ACEFA, Obala Agricultural College (*IAO: Institut Agricoled'Obala*), the Nkométou Local Group Committee (*CLG: Comité Local de Groupement*) and by some members of the Prolinnova–Cameroon National Steering Committee (NSC), namely from the Chamber of Agriculture, Fisheries, Livestock and Forests (*CAPEF: Chambred'Agriculture, des Pêches, de l'Élevage et des Forêts*) and several NGOs, including the Prolinnova–Cameroon coordinator from COSADER. After Ekani presented his innovation to them, the local MSP members

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<sup>4</sup> COSADER: *Collectif des ONG pour la Sécurité Alimentaire et le Développement Rural* / NGO Group for Food Security and Rural Development



selected it as a case for PID, but Ekani appeared reluctant to be involved in the process for fear that others would steal his idea.

This led to several rounds of discussion with Ekani to allay his fears. Finally, in March 2018, at a meeting in Okola involving Ekani, Ntankeu (from ACEFA), the Prolinnova–Cameroon coordinator Jean Bosco Etoa and Ms Millie Dauriane Bavoua, a student at the University of Maroua, an agreement was reached to collaborate in research on this local innovation. The two main arguments that seem to have convinced Ekani were: i) the possibility of making scientific analyses of the quality of his product, about which he had expressed some worries; and ii) the opportunity for documenting and disseminating his innovation to attract potential investors in small-scale cocoa processing.

### Planning and implementing the research collaboration

Already during this meeting in Okola, the stakeholder consultations began for drawing up the research protocol. The interests of the partners in the research collaboration were shared and negotiated. Ekani and his wife were concerned about the keeping quality of the chocolate they produced and whether the addition of *kanwa* had any health risks. They also wanted to know how much *kanwa* is needed per unit of cocoa cake to significantly reduce the bitterness of the chocolate.

The student, who was preparing a thesis for a degree in Agricultural Engineering, and her academic supervisor from the University of Maroua were interested in the levels of macronutrients, minerals, total polyphenols and flavonoids in the chocolate produced by the farmer. The student presented a draft research protocol to the local MSP members in May 2018. The MSP members raised a question whether the chocolate would be acceptable to consumers outside the innovator's neighbourhood. In the end, all agreed on the following three main research questions:

- What is the effect of *kanwa* on the bitterness of the cocoa cake?
- What is the effect of *kanwa* on consumer acceptance of the chocolate?
- What is the effect of *kanwa* on the nutritional composition of the chocolate?

At the home of the Ekani couple in Fegmimbang, the student observed how the chocolate was produced in order to gain a good understanding of this artisanal process.



*Millie Bavoua & Ekani removing cocoa beans from their pods in Fegmimbang village (Photo: Millie Bavoua)*

She then produced the chocolate in the same way in the Laboratory of Food Science and Metabolism of the University of Yaoundé 1. She had been a student at this university before she was admitted to study agronomy at the University of Maroua. Because the village of Fegmimbang is 1370 km from Maroua, the Prolinnova–Cameroon coordinator and the student requested her supervisor in

Maroua (lecturer Roger Ponka) to make arrangements with the student's former lecturer (ElieFokou) at the University of Yaoundé 1, only 42 km from Fegmimbang, for the student to use the laboratory at Yaoundé 1 to analyse the chocolate made there.

This agreement to use the university laboratory did not include the farmer innovator, so he did not have an opportunity to take part directly in the laboratory work, and the actual chocolate that he and his wife made was not analysed there. The people working in the laboratory were aware that a farmer had originally developed the innovation, but the university regulations did not allow him to enter the laboratory.



*EliseEkani roasting cocoa beans and preparing kanwa to be added in her kitchen in Fegmimbang  
(Photo: Millie Bavoua)*

The research process in the laboratory ran into some problems because some reagents were out of stock and some equipment was lacking. These problems were circumvented by collaborating with other researchers at the *Institut de Recherche Médicale et d'Études des Plantes Médicinales* (IMPM – Institute of Medical Research and Medicinal Plant Studies) and the research station of the International Institute of Tropical Agriculture (IITA) in Yaoundé. As ElieFokou, the lecturer at the University of Yaoundé 1, was highly interested in the research, he took the initiative to contact the latter two institutions and also managed to arrange a reduction in costs for the analyses.

### **Outcome of the research collaboration**

The results of the research collaboration seemed to satisfy all the partners involved. The student and her supervisors at the two universities were able to confirm that *kanwa* actually reduces bitterness and is not toxic, and they have also determined the nutritional composition of the chocolate. The innovative couple found out that their processing method produced good-quality chocolate in the university laboratory. After discussions with the student, the couple learnt that their problems in conserving the chocolate were probably due to poor water quality and hygiene while processing the chocolate, e.g. because they did not wash their hands or they did other tasks like feeding pigs or caring for a baby at the same time as processing the chocolate. They now know how much *kanwa* should be added per unit of cocoa cake. In addition, the couple gained ideas for new products: they had previously produced only dark chocolate but, after interaction with the student and the lecturer from the University of Yaoundé 1, who suggested different options to try, the couple started making three types of chocolate – with roasted and finely ground peanut butter, with milk and with lemon.



The student had also conducted tasting tests on the Yaoundé 1 campus, which confirmed wider consumer acceptance of the product of this local innovation. She presented her results at a public defence of her thesis at the University of Maroua, and both she and Ekani presented the results during the celebration of the International Farmer Innovation Day on 29 November 2018 at Ekoumdouma.

The Ekani couple is now seeking funds and structures to acquire small-scale equipment for making chocolate and to set up a business. Prolinnova–Cameroon was able to give some relevant contacts.

### **Lessons learnt from this experience**

“I was doing research but I wasn’t aware of it”, exclaimed Mr Ekani after taking into his hands the documents that had been produced on the basis of his innovation. This suggests that innovative farmers may not be sharing the knowledge they gain through their informal experimentation because they think that research is a domain reserved for scientists. The Ekani couple’s local innovation can contribute to reducing the use of sugar in making chocolate, which could bring benefits for human health, but this became known only through deliberately seeking cases of local innovation. The fact that the farmer was not even allowed to enter the laboratory where his innovation was analysed reveals that farmers are still being excluded from being full partners in agricultural research.

For joint ARD, it is important to cultivate good relationships between relevant stakeholders. The MSP that was set up in Nkométou managed to bring together three institutes of higher education, two research institutes, two rural advisory services, several NGOs and the innovative farming couple Ekani in joint research in a way that created mutual appreciation of the knowledge of farmers and scientists and paved the way for closer collaboration.

### **Acknowledgements**

The author would like to thank Mr and Ms Ekani for agreeing to engage in this PID process, as well as Ms Millie Bavoua and her university lecturers – Roger Ponka in Maroua and ElieFokou in Yaoundé 1 – for supporting the couple in seeking answers to their research questions. Bertrand Ntankou from ACEFA and other members of the local MSP from Obala Agriculture College and the Nkométou CLG as well as members of the Prolinnova–Cameroon NSC assisted in identifying and selecting the innovation for PID and gave advice and encouragement during the PID process. The technical assistance of IMPM and IITA in Cameroon is also appreciated. This work under the Proli-FaNS project was funded through Misereor/KZE, which also covered the costs of backstopping by the IST.

## Chapter 4

### Farmer–scientist interaction to control fall armyworm in Ethiopia

by Beza Kifle, Prolinnova–Ethiopia coordinator, and Yohannes Gebre Michael, Addis Ababa University

#### The innovator and his innovation

Gebreyesus Tesfaye is a small-scale farmer who lives in the hamlet of Hageresalam in Kewanit Kebele (Ward) in Tahtay Maychew Woreda (District) in Tigray Region of northern Ethiopia. In 2015, he developed a local biopesticide to control insects in his crops, mainly in maize, as pests had reduced his maize yield by up to 40%. Within a radius of roughly three kilometres from his home, he collected leaves of about 45 different plants that had a bitter taste, such as (local names) *tsaedakelamitos*, *shambako*, *gidaanim*, *shmti*, *tsaeidaengule*, *alke*, *tsaedaeka*, *engule*, *ere*, *lehay*, *htsawtsi*, *awusho*, *sur betray*, *tetaelo*, *awlie*, *trnaka*, *habitselim*, *gesho*, *cheindog*, *tahsos*, *andel*, *hariekelbi* and *hambokita*. After chopping and grinding the leaves using a mortar and pestle, he combined the mixture with goat urine and salt to make a biopesticide in liquid form, which he found to be very effective.

In 2016, the invasive pest fall armyworm (FAW, *Spodoptera frugiperda*) appeared in Tigray. Local farmers call it *barnose*. Gebreyesus immediately started to experiment with his innovative botanical treatment, locally called *tserebalie*, to see if it was also effective in controlling FAW.

He is a member of a group of farmer innovators in Tahtay Maychew District that works with Best Practice Association (BPA), a local NGO that collaborates with the District Agricultural Office in coordinating the Proli-FaNS project of the Prolinnova–Ethiopia network. This project gave Gebreyesus opportunities – through different events such as training courses, workshops, a farmer innovation fair and learning visits to his farm – to present his innovation to people from numerous organisations, including staff from the Axum Agricultural Research Center and Aksum University. Some visitors, including formal researchers from these organisations, suggested that he reduce the number of plants used in his biopesticide so that it would take less time and labour to prepare.

#### Bringing in formal researchers

After four male staff members of the Shire Campus of Aksum University saw Gebreyesus' innovation at a farmer innovation fair organised by Prolinnova–Ethiopia in February 2018, they started to conduct their own experiment to validate the effectiveness of the biopesticide and to see if they



could reduce the number of plants used yet still get the same effect. They thought that this would make it easier to spread the innovation. On an experimental plot of the university in Sereklaka District, they tested the biopesticide made from 45 plants and also one made from only 15 of the plants. They added water to the botanicals so that these were easier to grind, whereas Gebreyesus chops and grinds the leaves for his biopesticide without adding any water.

The Aksum University staff had taken part in a short training on PID organised by Prolinnova–Ethiopia, but they worked on improving the local innovation on their own. They had gained funds for this research from an IFAD-supported small-scale irrigation project in which the farmers face a challenge of infestation by FAW.

### Farmers' continued experimentation

In the meantime, other farmers in Gebreyesus' neighbourhood who are in the group of local innovators continued to do their own informal experimentation to see how they could reduce the number of plants used and also use different plants. The farmers advanced with this fairly quickly, frequently exchanging informally with each other.

Gebreyesus himself also experimented on his own to see if he could reduce the number of plants used, but remained convinced that his mixture with all 45 plants is best. In any case, he regards it as better than the Aksum University researchers' mixture with 15 plants. The biopesticide that he makes without adding any water to the plants before grinding completely kills the FAW in the maize, whereas he heard via the Proli-FaNS learning-site coordinator that the mixture of 45 plants that the Aksum University staff made with water added did not kill the FAW completely. Gebreyesus thinks this may be because the water diluted the toxicants in the goat urine.

He claims that his innovation is very effective in controlling the FAW, and other farmers obviously believe him. Many farmers who visited Gebreyesus' farm – both those from the locality and those from outside – said that they benefited from his innovation. As a result of using the local biopesticide



(in a variety of botanical mixtures they have developed themselves), they say that they can produce more grain (mainly maize and *teff*) and thus can attain greater food security and nutrition for their families. Because it is a great deal of work to make the biopesticide, above all, to collect the many ingredients, some farmers in the community prefer to buy it from Gebreyesus, who sells it for up to 150 Ethiopian Birr (almost €5) per litre and thus earns additional income for his family. The farmer is now setting up a shop in a nearby town to sell the

In addition to trying out different combinations of local plants and livestock urine to control FAW and other pests in their cereal crops, some members of the farmer innovator group are testing locally developed biopesticides to control pests in fruit trees and vegetables. Moreover, the original farmer innovator Gebreyesus accepted an invitation to work closely with the early warning committee of Tahtay Maychew District to control pest outbreaks.

### Interaction between farmer innovators and formal researchers

During the course of the farmer-initiated research on FAW, numerous stakeholders were involved at different stages. The farmer innovator group and staff members of the Axum Agricultural Research Center, Aksum University, the Tahtay Maychew District Agricultural Office and BPA all took part in the PID training provided by Prolinnova–Ethiopia. Staff from the Agricultural Office and BPA identified and documented local innovations, including the work of Gebreyesus. The farmers did their own experimentation in their fields, while Aksum University staff did their experimentation at the

university's research station, building on the farmer innovator's idea. The Agricultural Office and BPA organised activities for sharing the local innovation to combat FAW, as already described above. The institutional involvement of the research institute and the university in the PID process was limited because the collaboration with farmers was not part of the core programmes of these two institutions. Moreover, the PID training had been too short, so the formal researchers did not have enough knowledge and skills to be able to keep up with the speed of the farmers' informal experimentation, nor could they cope with the way the farmers were exploring different options to control FAW, while the formal researchers were looking at only one option, as if there could be only one standard solution to the problem.

There has been little direct communication between the formal researchers and the farmers; the communication was only indirect, via the coordinator of the Proli-FaNSwork at the action-learning site. Thus far, it has not been possible to bring the Aksum University researchers and the farmer innovators together in a workshop or other meeting to compare their results of their respective experimentation. For this, the researchers are expecting to be paid by Prolinnova–Ethiopia for every time they meet with the farmers, even though they have funding from another source to conduct research on controlling FAW. With its limited budget for the Proli-FaNS project, Prolinnova–Ethiopia cannot make such payments to the formal researchers. Moreover, because of budget constraints for the laboratory work, the results obtained by the Aksum University researchers were not yet available at the time of writing this paper, a year and a half after they started their research. Thus, there are obviously institutional constraints to conducting genuine farmer-led participatory research and development in the Axum area in a timely manner to meet the farmers' needs.

### **Lessons learnt from this experience**

A key lesson that can be drawn from this experience is that farmers – driven by the need to solve their agricultural problems quickly – are able and willing to do their own experimentation and innovation. Institutions of agricultural research and higher education could be useful partners of the farmer innovators in joint experimentation only if this collaboration can be integrated as a core activity in their research and teaching and learning. In this particular case of research on dealing with FAW, it appears that research that depends on a great deal of laboratory work is prohibitively expensive and time consuming. The scientists could probably move ahead more quickly in the research and give farmers more timely support if the scientists would become more engaged in on-the-ground experimentation together with farmer innovators in farmer-led joint experimentation.

### **Acknowledgements**

We are grateful to the innovator Gebreyesus Tesfaye and his fellow farmers for sharing with the Prolinnova–Ethiopia team about his innovation and about his and other farmers' experimentation with it. We are pleased that staff members of Aksum University have shown interest in the local innovation. We thank the staff of Axum Agricultural Research Center, Tahtay Maychew District Agricultural Office and BPA for helping identify and document local innovations, including that of Gebreyesus. We likewise acknowledge the farmer innovators from the Enebsa Sar Mider (ESM) action-learning site for their feedback and ideas during various workshops and a field visit to the farmer innovators in Tigray. Also staff from the Agricultural Office, the Technical and Vocational Education and Training (TVET) institute and the Agriculture College in ESM provided support. We appreciate especially the support provided by Miseror/KZE, including an encouraging visit from the Africa Desk Officer Sabine Dorloechter-Sulser to Gebreyesus and other innovators in Tigray in December 2017.

## Chapter 5

### Women-led joint experimentation on a local innovation in *wasawasa* food preparation in Ghana

by Gladys Gamor, University for Development Studies; Naomi Zaato, Municipal Department of Agriculture; and Joseph Nchor, Prolinnova–Ghana Coordinator

#### The innovator and her innovation

Ms NeinaNaginpoan, a 29-year-old small-scale farmer, lives with her husband and two children in Bunbonaayili, a rural community in Yendi Municipality in northern Ghana. Yendi lies about 90 km from Tamale, capital of the Northern Region, in the Guinea savanna agroclimatic zone. Most local inhabitants practise farming mainly for home consumption, and sell the surplus for cash to meet other needs. They grow mainly maize, sorghum, millet, yams, cassava, beans and soybean under rainfed conditions in one wet season per year and also grow some vegetables. They raise cattle, sheep, goats, pigs and poultry, mainly for cash to invest in cropping and for other purposes. Various economic trees such as shea, *dawadawa*, baobab, mango and cashew provide a major source of livelihood for the local people through income, fruits, nuts, fodder, medicines and fuelwood.



*Innovator NeinaNaginpoan (left); wasawasa ready to eat (right) (Photos: Joseph Nchor)*

The male head of the household provides the cereals for the family, while the women provide the soup ingredients through trade or income-earning activities. The women engage in food processing (shea, groundnut, *dawadawa* and rice) and trading in charcoal, fuelwood, cereals and cooked food. They also offer their labour in farming or off-farm activities to earn wages for food, clothing, education and healthcare for their children. By culture, it is uncommon for women to own land.

Besides helping her husband farm and feed the family, Neina prepares and sells a local food called *wasawasa* daily in the local primary school and weekly on the community market. *Wasawasa*, a common steamed dish in northern Ghana, is traditionally made from yam flour, but Neina's innovation is to make it from a mixture of maize flour and powder from the yellow pulp of the *dawadawa* (*Parkia biglobosa*) fruit. This gives the *wasawasa* a yellow colour and slightly sugary taste, which is well liked by children and young people in the community.

Neina steams the mixture for about 15 minutes in an earthen pot and then adds oil, salt, onions and pepper to make a delicious dish. She serves it with stew or *shito* (hot pepper sauce) for lunch. The *dawadawa* powder, which is rich in Vitamin A, enhances the nutrient content of all foods to which it

is added. Demand for Neina's *wasawasa* grew in the community and, as her business increased, she hired three women to work with her as wage labourers. She also serves the dish to her family on an almost daily basis. Thus, besides providing an alternative source of income, the yellow *wasawasa* improves the nutrition of her own children.

In the area, *dawadawa* powder had been little consumed in recent years, but it has now regained popularity, as has the *dawadawa* tree, which is highly protected in the local agroforestry systems. To give recognition to Neina's innovation and innovativeness, the Municipal Department of Agriculture (MDoA) awarded her with a certificate and agricultural inputs at the 2017 annual district-level National Farmers Day celebration held in Yendi.

### **Selection of the innovation for PID**

Through community meetings and consultations, the field team of the local NGO that facilitates the Proli-FaNS activities at the Yendi action-learning site – the Evangelical Presbyterian Development and Relief Agency (EPDRA) – informed the Bunbonaayili community about the project objectives and the PID approach. To ensure attention to women's innovations, the team formed separate groups of men and women farmers to identify and prioritise local innovations for food and nutrition security.

The criteria for selecting innovations for PID were jointly developed and agreed by the community and the local MSP set up by the Proli-FaNS project in the Yendilearning site. In line with the project objectives, innovations were sought that improved food security, addressed gender inequality and empowered women technically and economically. The local innovators were involved in ranking the innovations, as the selection of topics for PID depended on the innovators' commitment to engage in joint research to further develop or refine their innovations. Using these criteria, the women's groups, other local farmers, the Community Chief and his elders, local MSP members, Municipal Assembly representatives, MDoA extension staff, the EPDRA field team and the Prolinnova–Ghana technical support team selected Neina's innovation, among others, for PID.

Neina's innovation showed great promise for improving the nutrition and income of many households in the community and beyond. Her innovation builds on and fits into existing local diets and food-preparation practices, using mainly inputs that are locally available, and is environmentally friendly. Therefore, many other households in the area could easily apply it.

### **The PID process**

#### ***Objectives of the joint experimentation***

Meals consumed in the community consist mainly of carbohydrate staples. A nutritionist in the technical support team, Ms Gladys Gamor from the Department of Family and Consumer Science of the University for Development Studies (UDS) in Tamale, suggested that, if the *wasawasa* made with *dawadawa* pulp could be further improved in its nutrient content through fortification with other ingredients, it might increase the access of local people to more nutritious diets to reduce hunger and improve the nutritional status of the families. Moreover, the supply of *dawadawa* pulp is seasonal; it becomes scarce and expensive in the late dry season and into the wet season before the trees bear fruit. This constrained Neina's ability to prepare and sell the food to her clients and to maintain a profitable business year-round. She was therefore eager to work with the nutritionist in joint experimentation to improve the nutritive content, taste and profit margins of *wasawasa* by adding or substituting with other flours, leaves and spices in preparing the dish.

#### ***Main actors and activities***

The nutritionist facilitated the PID process as co-researcher. Ms Naomi Zaato, WIAD (Women in Agricultural Development) extension officer, and Abu Mohammed, a male extension officer, both



from the MDoA, assisted her. The joint experimentation was led by the innovator Neina and the three women who help her prepare and sell her *wasawasa* and also make *wasawasa* in their own homes. Other key stakeholders involved were EPDRA field staff, local MSP members, the Community Chief, Neina's husband and other innovators in the neighbourhood.

The main activities were: meeting to plan and design the PID, acquisition of inputs and small tools, joint experimentation, monitoring, documentation, experience sharing and reporting. In more detail:

- Planning and design of the PID process involved the innovator, Proli-FaNS project coordinator, local MSP members, the technical support team (including the nutritionist from UDS), EPDRA and local extension staff. The project coordinator in ACDEP facilitated the process.
- Neina, her assistant Nafisa Hardi, the WIAD extension officer and the nutritionist met and agreed on what they would do and what inputs were needed for the experiment. Neina sourced all the ingredients except cowpea leaves from her household stock or on the local market. Through the local NGO partner EPDRA, ACDEP provided funds to help her buy some of the ingredients on the market. The cowpea leaves were bought from an irrigated garden outside the community because it was the dry season, when this ingredient is not available locally. EPDRA facilitated the provision of the equipment/inputs such as for preparing, selling, serving and eating the *wasawasa* (e.g. bowls, spoons, tables, benches and a wooden shed where the food was sold).
- Two members of the technical support team who had been trained as PID trainers in Kenya in early 2017 during the Proli-FaNS training for anglophone partners trained the field team and local MSP members in PID. The WIAD extension officer trained Neina and other local women in making soybean flour, measuring the ingredients and presenting the final dish, and also in gender issues and business management.

### **Conducting the joint experimentation**

The joint experimentation was conducted with measured quantities of the various ingredients and material substitutes, using Neina's innovation as the control. In the process, the women learnt how to measure ingredients for preparing nutritious foods. The experimentation led to variants of the dish, by adding bean leaves or different types of flour to the *dawadawa* flour when preparing the *wasawasa*. The women also added *dawadawa* condiment to the *shito* sauce. Through the experiments with different ingredients, the women developed three *wasawasa* recipes – soybean *wasawasa*, millet *wasawasa* and bean-leaf *wasawasa* – in addition to the original innovation

developed by Neina (*dawadawa*-pulp *wasawasa*).

During the joint experimentation, Neina also tried making an improved *shito* that is richer in nutrients and tastier with an attractive aroma. For this, she used powdered pepper, cooking oil, tomato paste, sliced onions, ginger, pounded anchovies, *dawadawa* condiment, salt and water.



**Co-researchers display wasawasa variants from the experimentation (Photo: Joseph Nchor)**

### **Assessing the results of the experimentation**

The nutrition researcher collected and analysed data on the results of the joint experimentation, using a panel of 30 people to evaluate taste, aroma, colour, texture, preferences and acceptability.

The panel included the Community Chief and his elders, farmers, other women, the *Magazia* (traditional woman leader), men, schoolchildren and teachers. The field team, the technical support team, local extension staff and the Proli-FaNS coordinator also took part in the assessment.

The criteria jointly developed to assess the food-preparation process and results were: ease of preparation, adaptability of the dishes, access to ingredients for the dishes, benefits to community members especially women and children, taste, aroma and appearance. The feedback received from the community participants included:

- ✓ The *wasawasa* made with the millet and soybean flour tasted less sugary than Neina's *wasawasa* made from maize and *dawadawa* pulp alone; children were more attracted to her *wasawasa*.
- ✓ The *wasawasa* made with the millet and soybean flour were more sustaining, providing more energy and also made one drink water continuously; it was very appealing and palatable to eat.
- ✓ The seasonal cultivation and supply of bean leaves and other leafy vegetable substitutes will limit preparation of the bean-leaf *wasawasa*. Also, soybeans are expensive in the off-season.
- ✓ The *dawadawa*-spiced stew was delicious and promoted consumption of more *wasawasa*.
- ✓ Neina was delighted to see that the additions (soybean or millet flour, or bean leaves) helped reduce the quantity of the seasonally available *dawadawa* pulp needed to make *wasawasa*.
- ✓ Participants were generally excited about the improvement in nutritional value and diversity of the *wasawasa* dishes they saw and tasted – and that they could make them in their own homes.
- ✓ Improvements in taste, aroma and colour were made; when the quantity of the *dawadawa* pulp was reduced in the other dishes, this did not affect the taste and aroma of the final product.

Neina fully embraced the improvements to her innovation developed through the joint experiments. She now prepares the *dawadawa* condiment *shito* to sell with the new *wasawasa* recipes, which many people like and patronise. Her sales have increased still further, and she feeds her family daily with the more nutritious *wasawasa*. She trained four more women, who now prepare the *wasawasa* for their families, and she has shared her new *wasawasa* recipes with three other communities.

Opportunities identified by Neina, other local women and the nutritionist for further experiments include: i) using yam, sweet potato, sorghum or rice flour to prepare *wasawasa*; ii) adding fermented *dawadawa* seed condiment to the *wasawasa* mixture before steaming; iii) using other locally available leafy vegetables, e.g. moringa or amaranthus, as substitutes for bean leaves; and iv) producing and selling the leafy vegetables, especially during the dry season, as a further income-earning opportunity. Neina has started to grow beans to harvest and use in her *wasawasa*.



**Sensory evaluation of the improved dishes by school pupils, teachers and field team (Photos: Gladys Gamor)**



The women involved in the PID shared their experiences and results with other women, men, youth, other community members (chief/elders), NGO partners, extension officers and MSP members through face-to-face interactions at community-level sharing workshops, meetings, discussions and inter-community innovation-sharing sessions organised by EPDRA. They also hosted women and men innovators and other stakeholders from the Bongo action-learning site of the Proli-FaNS project.

### ***Roles played by stakeholders in the PID process***

- EPDRA (the local NGO partner), working closely with the local MSP members and the technical support team, facilitated selection of the innovation, supported planning and design of the PID, and coordinated the process. It provided some funds from the Proli-FaNS project, e.g. it covered i) expenses for travel, food and accommodation of the co-researcher from the university, who is also a member of the CP's technical support team; ii) travel costs of one student who worked with the innovator; and iii) the cost of materials for recipe demonstration and sensory evaluation at the university campus. EPDRA also supervised, monitored and recorded the PID activities and reported to ACDEP as project coordinator.
- The MDoA extension staff assisted in identifying and selecting the innovation and in planning and designing the PID process. They also trained the innovator and her assistants in aspects of food processing and business management, advised the innovator, and played a linking role between the innovator and EPDRA and ACDEP.
- The technical support team and local MSP members facilitated community-level consultations for identifying and selecting the innovation, as well as the planning, design, implementation and monitoring and evaluation (M&E) of the PID process. They also helped train other technical support team members, extension officers and local stakeholders in PID.
- ACDEP and EPDRA coordinated, backstopped and monitored all the PID activities and processes at the learning site. ACDEP also disbursed project funds for the PID and shared the outcomes with the Prolinnova–Ghana NSC, Proli-FaNS project partners in other countries and the donor. ACDEP, EPDRA and the nutrition researcher prepared the documentation (written report, video recording, photographs) of the process and activities.
- The innovator Neina led the process of joint experimentation and recipe development, shared the outcomes and trained other women in her innovation and variations on it. Her relatives encouraged and assisted her during the joint experiment and the experience-sharing sessions.
- Other innovators identified in the community as well as other farmers helped identify and prioritise the innovation for PID and learnt how *wasawasa* could be improved. Many men, women and youth in the community observed the joint experimentation process, and some women assisted the innovator in some tasks (making fire, pounding, mixing, washing utensils etc). The community also took part in the sensory and acceptability tests, made comments and shared their views on the process and products.
- The nutritionist from UDS was the main co-researcher during the PID. She co-facilitated the processes of selecting the innovation for PID, planning and designing the experimentation, and identifying the inputs needed. She gave technical guidance to Neina and the other women during the experimentation with different *wasawasa* variants and helped the women measure the ingredients. She conducted the sensory and acceptability tests among community members and other stakeholders and helped the community share the PID outcomes. As a lecturer, she supported further validation and wider promotion of the findings by supervising students' theses on the PID process. She wrote documents on nutritional fortification and preparation of the food and, together with the MDoA co-facilitator and Neina, trained other women and monitored

dissemination of PID outcomes. She encouraged further local innovation and farmer-led joint experimentation by integrating the PID approach into her teaching and more widely within UDS.

- A female student in the Department of Family and Consumer Sciences at UDS did her undergraduate theses on improving *wasawasa*. She further validated and promoted the *wasawasa* variants developed through PID, under the supervision of the nutritionist. She conducted interviews in the community and on the university campus and assisted in the sensory assessment of the *wasawasa* variants on campus, where she also demonstrated the new recipes. She thus promoted awareness and consumption of local nutritious foods and helped to institutionalise the PID approach within the Department at UDS.

### **Assessment of the PID process**

The field team of the local NGO, the technical support team and the community members assessed the PID process as follows:

- The nutrition researcher and innovator agreed on the need for dietary improvement and jointly identified local ingredients for diversifying *wasawasa* recipes in a way that combined local and scientific knowledge about the availability and nutritional value of the components. They learnt from each other and gained mutual respect for each other's expertise.
- The innovator was proud to be recognised and felt empowered socially, physically and economically by the PID process; this built her confidence.
- The community members were excited by their involvement in the PID process, as was evident from their sustained enthusiasm. They were also proud because someone in their community developed the original innovation; this may be a reason why the local women were so interested in taking up the new ideas for home cooking and income generation.
- Men, the Community Chief and elders, schoolteachers and children took active part in the sensory assessment of the dishes and gave their views and recommendations about nutritional characteristics, thus showing high interest in the objectives and the outcomes of the PID.
- The PID process brought the stakeholders closer together and led to creation of a strong rapport and trust between the farmers and the researcher and technical team, thus making them all willing to give more of their time and other resources to do similar activities in the future.
- The farmers saw the PID process as being useful and worth the time they had spent on it. They were grateful to the local NGO and technical support team for working with them, "opening their eyes" and helping them discover the hidden potentials and talents in them.
- The community members were awakened to possibilities to diversify their livelihood activities in ways that do not harm the environment and require relatively few resources (money, labour, time, skills, knowledge); most of the materials are available and easily sourced nearby.

### **Challenges encountered during the PID process and how these were addressed**

Because the innovator and the other rural women involved in the PID were illiterate, they found it difficult to use a scale to weigh the ingredients and to record the amount of ingredients used in the experiment. The nutritionist therefore taught them to use container measures to obtain the same quantities as with a scale. Neina and her cooking assistants started attending evening literacy classes offered by the Department of Non-Formal Education to improve their literacy and numeracy skills.

Because women usually start making supper at about 4 pm, it was difficult to keep their attention on community development activities after this time. This was especially so for the community-level PID sharing events and training of other women. Therefore, such activities were started and ended early in the day. Because women were not available for interactions during the peak of the farming season and on market days, EPDRA did not schedule PID or dissemination activities at these times.

## **Key lessons learnt during the PID process**

The main lessons learnt by the Prolinnova–Ghana partners during the PID process were as follows:

- Engaging with a local innovator in a PID process helps ensure that the innovations developed or improved during the process are accepted by other farmers.
- Engagement and involvement of a cross-section of the community members – especially the opinion leaders – in the PID process led to greater commitment of these stakeholders.
- Encouraging the farmer innovator to lead the process helped build her confidence and that of her peers, since they participated fully and learnt through experimentation, rather than being mere spectators of demonstrations without gaining much knowledge or experience.
- The step-by-step approach – not rushing through the process – helped all participants gain a good understanding of the PID process, so that they are more likely to be able to teach others.
- The financial support given to the innovator to buy inputs for the experiment and to share her findings and teach other interested women in and beyond her community eased her burden and won her cooperation throughout the process and her willingness to teach others.
- Facilitators of PID involving women should consider their time constraints so as to ensure that the PID does not deprive the women of time for household chores and other productive roles.

## **Plans to use the experience to institutionalise the PID approach**

Prolinnova–Ghana intends to scale up the PID approach by documenting and sharing the process and results with ARD stakeholders, and by using the regional Research and Extension Liaison Committee (RELC) meetings as fora to share the experience and to influence mainstreaming into extension, research and development approaches and programmes. The Prolinnova–Ghana partners will facilitate exhibition of the results of the joint experimentation at Farmer Day celebrations at district and regional level, and share the process and results in policy workshops in order to influence policy formulation. It will also collaborate with relevant faculties, departments and units in academic and research institutions to highlight how UDS supported farmer-led joint research and innovation.

In addition, the nutrition researcher will mainstream the PID approach into her course curriculum in her department in UDS and also incorporate the approach and results into her current doctoral research project.

## **Acknowledgements**

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## Chapter 6

### Two cases of collaboration by farmer innovators and scientists in Kenya

*by Vincent Mariadho, Prolinnova–Kenya coordinator, and MakongeRigha, Regional Program Officer, World Neighbors*

The Kenya Agricultural and Livestock Research Organization (KALRO) has been actively involved in the Proli-FaNS project as a member organisation of the Prolinnova–Kenya CP and as the M&E focal organisation for the project. Farmer-led joint experimentation on local innovations provides a good opportunity for interaction and cooperation between farmer innovators and scientists. Here are two examples of such joint experimentation – on hanging gardens in the Proli-FaNS action-learning site in Kisumu County in western Kenya and on organic fruit-fly traps in the other action-learning site in Makueni County in eastern Kenya. The PID processes were facilitated by the NGO World Neighbors, the host organisation of Prolinnova–Kenya, which drew in researchers from KALRO who had the interest and expertise to interact with the farmer innovators. The researchers were involved in the national and local MSPs already before the Proli-FaNS project started.

#### Case 1: Hanging gardens: PID on an innovation by Jack Onege in Kisumu County

##### The innovator and his innovation

The hanging garden was developed by Jack Onege, a retired primary school teacher who had been supplementing his low pension with subsistence farming. He lives in Osiri Village in Kisumu County. The area is characterised by stony land that is very difficult to cultivate, as one has to invest great efforts (or hire labour) to remove the stones and level the plot. Jack has only a small parcel of land, about 0.05 ha left over after giving portions of his land to his two sons. His innovation seeks to address challenges of land scarcity and erratic rainfall – challenges faced by many small-scale farmers in the area who would like to produce vegetables. Jack also keeps free-ranging chickens and other livestock, as do many of his neighbours, but the animals stray into the fields and gardens and destroy the crops and vegetables.



*Farmer innovator Jack Onege (right) discusses his innovation with Kisumu LSC members and Prolinnova–Kenya coordinator  
(Photo: Domnick Onyango, Community Facilitator, Rural Development Initiative)*

Seeking an inexpensive solution to these problems, Jack tried growing vegetables in recycled gunny bags suspended from the roof of his house. He collects the gunny bags from construction sites free of charge. He fills the bags with soil mixed with organic manure into which he plants the vegetables. His innovation attracted so much interest among community members, formal researchers and other stakeholders in ARD that the Kisumu Local Steering Committee (LSC, as the local MSP was called in Kenya) for the Proli-FaNS project selected it among a total of seven local innovations as a case for PID. The PID process involved a variety of players, including the farmer innovator, other farmers, the County Department of Agriculture, KALRO, some local NGOs and a community-based organisation Rural Development Initiative (RUDI), which were all represented in the LSC.

### **Involvement of formal researcher in PID on this innovation**

Ms Martha Opondo, a researcher stationed at KALRO Kibos Centre in Kisumu, is the focal person for KALRO in the Kisumu LSC. She was involved in the process of PID on the hanging-garden innovation in the following ways.

#### ***Selection of the local innovation for PID***

In the Kisumu LSC, during the stage of vetting local innovations for joint experimentation, Martha assisted the community and the LSC in identifying local innovations with research potential.

#### ***Refining the research questions proposed by the farmer innovator***

The “vetting team”, which included the LSC and two community representatives (a man and a woman), facilitated the local innovators whose innovations were proposed for PID to formulate their objectives for joint experimentation and their research questions. Martha played a key role in helping the innovators refine their research questions. Jack was eager to engage in joint experimentation with KALRO scientists because he wanted to explore the viability of his hanging gardens in terms of yield, labour inputs and water use. Through Martha’s interaction with him and the vetting team, the following were agreed on as the research questions about his innovation:

- How does the productivity of the hanging gardens compare with that of normal open-field and multistorey gardens?
- How do labour demands and other factors of production in the hanging gardens compare with these factors in open-field and multistorey gardens?

The multistorey garden is a technique being promoted by many projects working with small-scale farmers in Kenya. It consists of a bag filled with soil and compost, with seedlings – mainly of vegetables and tomatoes – planted in the sides of the bag, which sits on the ground. The formal researcher suggested bringing also the multistorey garden into the comparison of efficacy and suitability of different gardening techniques, and Jack and the LSC agreed with this.

#### ***Guiding the innovator through the experimental design and setup***

Good experimental design and setting up an experiment are very important aspects of research, because they form the foundation for comparing and analysing the data collected to be able to draw conclusions. This is a key area in which the researcher from KALRO participated, especially in providing technical advice. In the course of the interaction between the formal researcher Martha and the local innovator Jack, they agreed on an experimental design that was carried out as follows:

- Three setups were compared: the hanging gardens (10 hanging gardens made out of cut-off 20-litre jerricans), a multistorey sack garden and an open-field garden, all three managed by the farmer at his home. He prepared the three garden setups on 2 April 2018.
- He sowed seedlings of tomatoes and collard greens (open-leaf cultivar of *Brassica oleracea*, similar to kale, for the dish known locally as *Sukuma wiki*) in his nursery on 4 April 2018 and he transplanted the seedlings into all three garden setups on 1 May 2018.

- He did “gapping” (replacing dead seedlings to improve plant population) on 11 May 2018.
- Each garden setup was watered every evening with about 500 ml per plant per day in the hanging gardens, 800 ml in the multistorey sack garden and 1 litre in the open-field garden. This difference in watering was due to differences in the ability of the different garden setups to retain moisture: the hanging garden has a higher moisture-retention capacity, followed by the multistorey sack garden, while the open field garden has the lowest.
- He replicated the experiment on 30 August and 6 November 2018, marking these as second and third cycles, respectively.

### ***Guiding and training local innovators in collecting and recording data***

At the beginning of the PID process, the researcher Martha and other members of the LSC trained the farmer innovators in data collection and record keeping. Both activities are very important for any experiment to ensure accuracy and to be able to draw well-founded conclusions. The researcher was present throughout the training, facilitated some training sessions and also guided the farmer experimenters during subsequent monitoring trips. Jack collected data on time until plant maturity, yield per plant, water use and labour time inputs for watering and weeding. He recorded the data in a notebook provided by the LSC after the training on data collection.

### ***Periodic monitoring of progress in the PID***

As a member of the LSC, Martha was involved in monitoring the experimentation process. During her monthly door-to-door visits to Jack and the other farmer innovators, she served as a resource person in recommending any adjustments that she, other LSC members and the farmers deemed necessary.

### ***Evaluating the process and outcomes of the PID***

As KALRO is the focal organisation for M&E of the Proli-FaNS project, it tasked Martha to lead the M&E in the Kisumu action-learning site. She also facilitated the final evaluation of the process and outcomes of the farmer-led joint experimentation and wrote a synthesis report on this.

### ***Analysing the innovation from a gender perspective***

Martha was among the LSC members who took part in the Gender-Responsive Farmer-led Innovation Development Workshop organised by the Royal Tropical Institute (KIT) and World Neighbours Kenya in October/November 2018 in Nairobi as part of an FAO-funded project for mainstreaming gender in farmer-led research and development. After this workshop, Martha analysed the hanging-garden innovation and other local innovations from a gender perspective using a “gender lens” (FAO 2018). Jack was also involved in the analysis of his innovation, but his wife was not.

The analysis revealed that Jack owns the land and set up the stands for hanging the gardens. He had started by hanging containers from the roof of his house but then built stands for a larger number of hanging gardens. He also does the watering and other work involved, assisted by his wife, Beatrice Wagude. During school holidays (April, August, November and December), his sons also help in daily monitoring, weeding and watering of the gardens. His wife helped make the hanging gardens, while Jack or his sons hung them up. The innovation has helped the family deal with land and water scarcity so that it can grow vegetables year-round. This boosts household income and also provides a steady supply of vegetables for the family to eat. Jack’s wife sells the vegetables, mostly at the farm gate but Jack – as the male household head – controls the income. In his village, his innovation in gardening is considered unusual, as kitchen gardening and small-scale vegetable production are normally regarded as a woman’s domain.

### ***Outcomes of the joint experiment***

From the data comparing the time until plant maturity, plant yield, water use and labour inputs for watering and weeding, the farmer innovator, the formal researcher and the LSC concluded that the



hanging garden requires less water than the multistorey sack garden or the open-field garden. The vegetables in the hanging garden matured faster than in the other two setups. Even though the hanging garden was given less water and lower labour inputs, the yield was good compared to the multistorey and open-field gardens. Furthermore, the co-researchers found that the hanging garden is less labour-intensive, as it requires less weeding (mostly uprooting) and watering. They also observed that only the vegetables grown in the open field were infested with any pests; the hanging garden and the multistorey sack garden appear to be good for integrated pest management (IPM). Thus, the hanging garden is not only convenient but also quite efficacious. A farmer using Jack's innovation can produce vegetables year-round with good quality and quantity of yield.

## **Case 2: Organic fruit-fly trap: PID on an innovation by Ms BenignaMuumbua (Makueni)**

### **The local innovator and her innovation**

Fruit growing is one of the main economic activities and sources of livelihood of small-scale farmers in Makueni County. Fruit flies are therefore an enemy of the people. Conventional control measures such as commercial fruit-fly traps are available, but only for larger-scale farmers with sufficient means. Small-scale farmers have to find other ways to prevent losses of fruit as a result of fruit-fly infestation. One such farmer, Ms BenignaMuumbua, decided to try out a concoction of lemon, onion and honey, which she christened "organic fruit-fly trap." The Makueni LSC selected this innovation, together with three other innovations, for PID.



*Innovator BenignaMuumbua explaining her organic fruit-fly trap to Makueni LSC members  
(Photo: Cheshawettasinha)*

### **Involvement of formal researchers in PID on this innovation**

Two scientists from KALRO – Geoffrey Kamau (who is also the Chair of Prolinnova–Kenya's NSC) and Ms Martha Opondo – were involved in this PID case in the following ways.

#### ***Refining the research questions***

They helped the innovator refine her research questions. Through discussion, the innovator and the scientists reached agreement to explore the following questions in joint experimentation:

- How effective is the fruit-fly trap compared to the chemical methods commonly used to combat pests in fruit trees?
- To what extent does the fruit-fly trap impact on the environment?

### ***Experimental design, setup and implementation***

The scientist–farmer interaction was aimed at ensuring a smooth process of farmer-led experimentation with measurable and verifiable outcomes. The co-researchers (Benigna and the KALRO scientists) agreed on and implemented the following experiment:

- Three custard apple (*Annona reticulata*, locally called *tomoko*) trees were used. In the first tree Benigna placed the fruit-fly trap (her innovation), in the second a trap with the conventional fruit-fly insecticide (methyl eugenol) and in the third an empty bottle (the control).
- Benigna made her concoction of lemon, honey and water on 9 July 2018 and, the next day, she placed her trap in the first tree, placed the conventional trap in the second tree and placed an empty bottle in the third tree. The trees are approximately 10 m apart.
- She replaced the first concoction on 1 August 2018. She did not replace the conventional fruit-fly insecticide; she only removed, counted and recorded the trapped flies.
- She did two more replications in the custard apple trees on 7 November and 18 December 2018.
- She also repeated the trial with a mango tree on 7 November 2018, as she wanted to find out how effective the trap is for another type of fruit tree that is common in the area.

The two KALRO scientists were involved in training and guiding the farmer innovator Benigna in collecting data and worked together with her in analysing the data. The NGO Inades-Formation Kenya, a ProInnova–Kenya member organisation in Eastern Kenya, worked with the KALRO scientists in monthly monitoring of the progress of the farmer-led joint experiment.

### ***Advising on concentration of the pesticide concoction***

The KALRO scientist Geoffrey Kamau advised the innovator on how best to regulate the concentration of the concoction without compromising on its efficacy but using relatively fewer resources, such as less honey. He also suggested that a sample be taken to the KALRO laboratory in order to identify the active ingredients in the concoction, with a view to exploring the potential for its commercialisation. However, this did not seem to be a priority in the farmer-led research and was not pursued by the time of documenting this PID case.

### ***Making a gender analysis of the local innovation***

The KALRO scientist Martha and some other members of the Makueni LSC who were trained during the above-mentioned workshop on mainstreaming gender in farmer-led research and development analysed the innovation from a gender perspective. Both Benigna and her husband were fully involved in this exercise.

The analysis revealed that Benigna's husband owns the fruit trees. Benigna manages them on a daily basis and came up with the innovation, for which she obtained permission from her husband. She prepared and helped install the traps. Her innovation reduced fruit-fly attacks and led to higher fruit yield and thus higher household income, which her husband controls. According to local culture, it is not acceptable for women to climb trees. Benigna therefore relies on her husband and/or son to hang the traps and to bring them down when necessary. The woman's innovation has been accepted by the male family members and put to use. This has given Benigna confidence to suggest other ideas to her husband, for instance, she influenced him to spend some of the additional income on home improvements. She now attends innovators' meetings, sometimes with her husband and sometime on her own.

### ***Results of the joint experimentation***

The farmer innovator and formal researchers drew these conclusions from their joint experiment:

- The number of flies collected in the innovative trap indicated the level of fly infestation: on average, the number of flies captured in the innovative trap in three replications was 23 flies (28,



22 and 19 for the first, second and third replication, respectively). Because these flies were trapped, no damage was caused to the fruits, a sign of the efficacy of the innovation.

- Since the concoction is made from locally available resources, the trap is cost effective and economically sustainable. For instance, 100 ml of the conventional fruit-fly insecticide costs €13.31 (Ksh 1500) while the innovative concoction costs the equivalent of €2.65 (Ksh 300).

### **Lessons drawn from both PID cases**

The collaboration between farmer innovators and scientists in the action-learning sites in Kenya revealed that small-scale farmers conduct various types of informal experiments in nearly all of their daily agricultural endeavours. However, most of the farmers are not doing this consciously. This was evident from statements of the farmer innovators involved. For example, Benigna Muumbua, who developed the innovative organic fruit-fly trap, said: “I have never imagined I can be a researcher. All these activities to me have always been just trial and error.”

Formal researchers have often ignored farmer’s own skills in research or have deemed the farmers’ knowledge to be inferior to that of scientists. The mutual interaction of the farmer innovators and the KALRO researchers during the joint experimentation revealed that farmers are inquisitive and can contribute to formal research. During the interaction, the farmers were obviously very eager to explore new things. Their eagerness was stimulated and maintained because the scientists recognised the farmers’ creativity and efforts in experimentation. The recognition boosts the farmers’ confidence and morale. PID is a tool that can be incorporated into scientific research approaches so that local farmers’ knowledge and creativity can make a stronger contribution to addressing challenges faced by many small-scale farmers.

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## Chapter 7

### What have we learnt from these PID cases?

*by Brigid Letty, Georges Djohy, Joseph Nchor, Ann Waters-Bayer and Chesha Wettasinha*

#### Introduction

The six cases presented in this booklet clearly show the creativity and innovativeness of farmers and other members of rural communities. They also demonstrate the value of combining different sources of knowledge through a joint-experimentation or PID process. The process of drawing out some of the key lessons from these PID processes starts by summarising some of the key elements of the six cases:

- Validating the effectiveness of the local *goama* biopesticide (Burkina Faso)
- Validating the use of natron for reducing the bitterness of locally made chocolate (Cameroon)
- Improving the biopesticide used for the control of fall armyworm (Ethiopia)
- Improving the traditional *wasawasa* dish (Ghana)
- Testing the effectiveness of “hanging gardens” for vegetable production (Kenya)
- Validating the effectiveness of an organic fruit-fly trap (Kenya).

Documentation of PID, as has been done here, is seen as an effective mechanism for joint learning – highlighting the roles of different actors and some of the challenges that have been encountered as well as aspects that have worked well. Besides drawing out some key lessons from the six cases, this chapter also seeks to understand why the interaction of scientists with farmer innovators is not as close or as frequent as we may have hoped to see, despite efforts to institutionalise PID for more than a decade.

For many of the researchers that are involved in PID processes, the interest seems to be on validating the innovations or testing their effectiveness. Given that researchers and extension staff need to have sound evidence in order to be able to responsibly disseminate and promote the innovations, this is understandable, but the question still remains whether this is the most important aspect for the farmers – many of whom already believe in their innovations. However, in their agreement about the aim of joint experimentation, some farmer innovators and formal researchers indeed decided to validate local innovations – as evident in the list of bullet points above.

#### Summary of the six cases

Key points for each of the six cases from the five countries are summarised below as an introduction to the process of drawing out lessons across all the cases.

##### **Goama biopesticide case (Burkina Faso)**

Women came together to try to solve a problem that affects them all – namely, pest attacks on their crops. The selection of this case for PID was done jointly by an NGO and a farmer association according to a number of criteria – including willingness to share the results of the research. The objective of the PID was to validate the innovation. The actors involved included farmer innovators, a farmer organisation, an NGO, a government extension service, and scientists from a university and a national research organisation. The NGO facilitated the interaction between the different actors and organised reflection workshops. The roles of scientists included reviewing the literature, assisting in drafting the research protocol, monitoring and evaluating research results, and conducting laboratory analyses to scientifically validate the effectiveness of the biopesticide – because the women wanted to know how best to mix the biopesticide for it to be effective. The scientists also

gave some training to the farmers in research methodologies. The PID process led to addition of other plant components to the mixture. The roles of the actors were seen to be complementary, although it was highlighted that it was generally difficult to mobilise scientists and costly to involve them, as they charged fees for providing a service to the farmers.

#### ***Bitter chocolate case (Cameroon)***

This innovation was an adaptation of a local practice. A locally available substance called natron is commonly used to reduce bitterness when cooking bitter-tasting leaves for human consumption, and an innovative farming couple decided to try using it to reduce bitterness in their locally made chocolate. The local MSP proposed that this innovation be a case for PID, but the male innovator was initially concerned about sharing his knowledge and having his idea stolen. He finally decided to participate, as he thought that the PID might lead to investment in the family enterprise that he wanted to set up with his wife. After discussion about the design of the PID in the local MSP, a university student, supported by her supervisor, drafted a research protocol that focused on the use of natron in processing cocoa to make chocolate. Analyses of chocolate made by the student at a nearby university were conducted in the university's laboratory, but the innovators were not allowed to enter because of the university regulations. The university also collaborated with researchers at the Institute of Medical Research and Medicinal Plant Studies and the International Institute of Tropical Agriculture in order to acquire some reagents and equipment. The innovative couple seemed satisfied with the research outcomes and gained additional ideas from the scientists, but their exclusion from the student's research process reduced the participatory nature of the process. Of value was the fact that the innovative couple recognised that their activities were a form of research. The local MSP served as a mechanism to bring different actors together.

#### ***Fall armyworm case (Ethiopia)***

A farmer innovator developed a local biopesticide from 45 bitter-tasting plants mixed with goat urine. Some university researchers became aware of the biopesticide after attending a farmer innovation fair and they conducted their own experiments to determine the effectiveness of the biopesticide and to attempt to reduce the number of ingredients. In parallel, a group of local farmers including the innovator continued with informal experimentation. Ultimately, the innovator felt that his product was more effective than the one made by the researchers. It is important to note that, while some farmers make the biopesticide themselves, others buy it from the innovator. The lack of involvement of farmers in the scientists' research process reflects that farmer collaboration is not a core part of the programmes of the university. The researchers had attended training in PID, but it was perhaps too short to lead to changes in their attitude and approach. The researchers were not willing to engage in activities to share experiences with the farmers unless ProInnova–Ethiopia paid them, even though they had alternative research funds that supported their experimentation. Moreover, there was substantial delay in receiving the laboratory results because of budget constraints at the university.

#### ***Wasawasa case (Ghana)***

A female innovator prepared and sold a food product called *wasawasa*, which is traditionally made from yam flour, but she made it from maize flour and a substance from the fruit of an indigenous tree. The local MSP selected this innovation for PID. A university researcher saw opportunities to fortify the *wasawasa* and thereby improve its nutrient content, and also to find replacement ingredients to ensure availability throughout the year (during times when the indigenous tree did not bear fruits). This was of interest to the innovator, as she wanted to strengthen her business. Government extension staff also supported the PID process. The NGO played an important role in facilitating the process and drawing in the different actors including other community

members and “opinion leaders”. The CP’s technical support team provided training in PID, and the nutrition researcher provided training in food preparation. The PID process was strongly led by the local innovator and her group, with the researcher supporting the monitoring (using jointly developed criteria) and documentation of the process. Supervised by this researcher, an undergraduate student also did her research on the *wasawasa* variants. Key points were that the PID process was not rushed, and it took into account women’s time constraints and other responsibilities.

### ***Hanging gardens (Kenya)***

The farmer’s innovation, namely the use of hanging bags or containers to grow vegetables, addressed the common problems of land scarcity and erratic rainfall. It was selected by the local MSP for PID. The PID process involved a researcher from KALRO who assisted the innovator with refining the research questions, designing a sound experiment and also provided training in data capture and record keeping. The farmer conducted the experiment at his home. This is an example of an innovation that was developed by a man, but its application is being supported by his wife. Furthermore, it is an area (gardening) that is normally considered to be women’s domain.

### ***Organic fruit-fly trap (Kenya)***

A woman farmer developed an innovation comprising a mixture of lemon, honey and onion as an organic fruit-fly trap to prevent fruit losses. It was selected by the local MSP for PID. The PID process involved KALRO researchers who assisted with refining research questions and guiding data collection and who regularly monitored the process. They also had interest in making a laboratory analysis of the product but this had not yet been pursued by the time the case was documented. It was particularly interesting that the innovator had not previously recognised herself as a researcher.

## **Crosscutting analysis of the cases**

Some of the points that emerge from the analysis of the six cases strengthen our understanding of the reasons for weak farmer–scientist interaction in some cases and also provide insights into ways that farmer–scientist interactions could be strengthened.

There are clear examples where **university researchers seemed unfamiliar with working closely with farmers**, and university rules and regulations may even preclude it. In the bitter chocolate case, the innovators were excluded from all laboratory-related activities and it was not even their chocolate that was subjected to analysis; in the fall armyworm case, the university researchers did their own research on the innovator’s product. These are clearly weaknesses in a process that is designed to be participatory in nature. This is, however, not always the case since a female university researcher worked closely with the female farmer innovator in producing *wasawasa* in Ghana.

The **involvement of some actors depended on the availability of financial resources**. Sometimes innovators were given inputs to support their experimentation (mentioned specifically in the *wasawasa* case). Sometimes scientists required resources for their participation in the PID process. The extent to which they saw their participation as an opportunity to supplement their income, or whether their institution required the resources to cover their travel and per diem costs, is not clear. However, in two cases, it was explicitly mentioned that non-availability of resources limited the participation of the scientists. In the case of the work on combatting the fall armyworm, where the scientists were actually making use of the farmer’s innovation and had access to another source of funding, there are definitely questions about their unwillingness to take part in the PID process unless their costs were covered by the Proli-FaNS project. The extent to which PID is institutionalised within universities and research institutes is likely to impact on the availability of the institution’s resources to support scientist involvement.

Involvement of students in the PID process may be a way of channelling university resources into PID, if it is seen as having a direct benefit for the university in the sense of giving students the opportunity to do field-based research. However, students have only a limited timeframe for their involvement, normally limited to the fieldwork component of their studies when they collect data for their theses. Their supervisors need to be engaged on a longer term so that they can continue to accompany the PID process after the students leave. Supervisors need to have a good understanding of PID and oversee the students in the field. Even if the experiences with students in Cameroon and Ghana are encouraging, the Prolinnova network needs to give more attention to clarifying the students' and their supervisors' roles in the PID process, so as to ensure that young staff at universities and research organisations gain the knowledge, skills and experience to facilitate and support PID processes. Learning about farmer innovation and farmer-led joint research needs to be better integrated into institutions of higher learning.

In some cases, there appeared to be **interest by scientists only to use the outcomes of the PID process to contribute to their own research and further their careers**. To some extent, this is justified and highlights the needs for institutionalisation within research institutions such that participation of scientists in PID processes at least can be recognised within performance appraisal processes so that the scientists gain a direct benefit, albeit not a monetary one.

Some cases refer to the **use of scientific laboratories for analysing samples, testing toxicity and identifying active ingredients in innovators' products**. This highlights the complementary knowledge and facilities that can be brought into the PID process. However, there are costs associated with analyses and sometimes also a need to collaborate with other faculties or institutions in order to access equipment and reagents. In addition, delays are sometimes experienced in farmers' accessing the results of the analyses. It is important to clarify for whom, and at whose cost, the analyses are being made. If the innovators themselves have questions that require laboratory analyses, this differs from a situation where the formal scientists see the need to test or validate a product.

The cases highlight that usually **an NGO had played a role in facilitating an MSP or in brokering relationships between farmers and scientists**. As long as PID is not institutionalised, close interactions between small-scale farmers and formal researchers do not take place as a matter of course; a particular organisation needs to actively draw the necessary partners into the process. The PID process seeks ultimately to empower farmers so that they themselves can call on scientists for support (even without NGO mediation) and can control the PID process themselves, i.e. in truly demand-driven ARD.

The cases documented in this booklet reveal that **some steps have been taken toward institutionalising PID within universities and research organisations**, but it appears that the interactions between scientists and farmer innovators are often linked to specific projects rather than being "work as normal". This highlights that we are still some distance from seeing the PID approach firmly embedded within such institutions. Training of scientists in PID seems to be a necessary step to prepare them for a supporting role in farmer-led joint experimentation. Some of the cases mention that scientists took part in PID training but, in the fall armyworm case, the point was made that the PID training seemed to have been too short to lead to application of the principles within the scientists' work programmes.

For the Prolinnova CPs, **mainstreaming gender into PID processes obviously remains a challenge**. The Proli-FaNS project, by deliberately focussing on women innovators and their innovations in food and nutrition security, stimulated CP partners not only to look for women innovators but also to give attention to gender aspects within PID. Previously, through conventional gender training, many partners in the local MSPs – including the scientists involved in the PID – had been made aware of gender concepts, but they had lacked the skills to operationalise these concepts in their work. During

the course of this project, with additional support from FAO, members of the IST developed a set of guidelines for integrating gender into PID work on the ground. The cases from the CPs in Kenya and Ghana – which were most directly involved in developing, learning about and testing the gender guidelines – show the initial results of this exercise. The partners had to learn to ask the right questions to discover the gender implications in terms of division of labour, access to and control over resources, intra-household decision-making etc. The FAO-supported tailor-made training and on-the-job mentoring helped the participating researchers and other CP partners to start analysing the gender issues related to the farmer-led joint research.

As a result of the Proli-FaNSfocus on women, several cases of women's involvement in local innovation and PID were available for this booklet. However, the documentation of most of the cases – even those involving female innovators and female researchers – did not include an analysis of implications of the local innovations for men, women, youth and elderly in the households and communities. It also did not look at how gender differences affected involvement in and drawing benefits from the PID process. Some gender analysis was done in the two cases from Kenya but even that did not delve very deeply into the issues. There is obviously a need for further training and mentoring in addressing gender issues in promoting local innovation and farmer-led joint research.

### **Conducive conditions for PID**

The *wasawasa* case from Ghana and the two cases from Kenya show effective involvement of scientists in the PID processes, with the farmer innovators being recognised and actively involved as research partners. It is important to consider the contexts that are at play in these cases, as they may explain what creates conducive conditions for PID. In the Ghana case, the university researcher is a member of the Prolinnova–Ghana technical support team and was therefore involved already in the participatory screening and approval of innovations for PID. As a nutritionist, she had a special interest in co-facilitating the PID process on *wasawasa* after having listened to the questions, problems and intentions of the innovator to add value to her innovation. The researcher was also partly motivated by her own interest to use the PID outcomes in her teaching and research work. This led to her engagement of the female student for thesis work on *wasawasa*. In addition to this, Prolinnova–Ghana builds on a long experience of close interactions between ACDEP, UDS, the Council for Scientific & Industrial Research (CSIR) – specifically a scientist in the Animal Research Institute – and the governmental agricultural advisory services. This may explain the effective multistakeholder interactions seen in the *wasawasa* case. Moreover, it was important that the researchers were involved in the process from the very outset, already in identifying and selecting local innovations – preferably in identifying those in their own field of interest.

In Kenya, a scientist from KALRO who was a driving force behind setting up the Prolinnova–Kenya network from 2006 onwards was closely involved with the two cases from this country documented in this booklet. Furthermore, the CP was even hosted within KALRO for some time, which explains KALRO's strong support of PID processes. Moreover, KALRO has been involved in several projects related to participatory research and the researchers involved in the PID highlighted that publications (both popular and peer-reviewed) coming out of such interactions contribute points in the process of appraising researchers' performance. The long experience with participatory approaches, coupled with some strong individuals within the research institute who have been closely involved in Prolinnova from the outset, makes the situation much different than in a country like Cameroon, where the CP has sought links with research/universities only fairly recently.

## Conclusion

Despite variation in the level of involvement of scientists and in the approaches followed in the different cases, each of the cases in this booklet builds on a local innovation rather than an externally derived technology or practice. The process has taken different trajectories in different countries and at the different learning sites, with some deviation on account of the needs and interests of the scientists (e.g. addressing resource limitations, seeking data, career advancement, compliance with scientific or institutional rules/regulations/norms, financial reward). However, a central point is that everything converges towards solving farmers' problems using locally available resources.

MSPs, especially local ones, appeared as key mechanisms for mediating between the farmer innovators and the outside world to ensure that the PID leads to real change. They allow for exchange and collaboration between actors who often find it difficult to partner to solve problems or seize opportunities related to agriculture and food. The involvement of scientists in discussions to reassure farmers of the value of their innovations and the value in taking them forward, as well as opportunities that they may offer to access resources to implement joint experiments and disseminate innovations on a large scale, are very positive points.

The cases in this booklet show that there is value in strengthening linkages between farmers and scientists, while being aware of some of the challenges that are likely to emerge – also with regard to gender issues. There is also a need to build the consciousness and interest of scientists to see farmers – men and women – as partners in the experimentation process rather than only being sources of innovations to validate or improve. In this way, it will be possible to create true scientist–farmer partnerships in agricultural research and development.