

GHANA: JOINING WOMEN'S EXPERIMENTATION TO IMPROVE THE NUTRITIONAL VALUE OF LOCAL FOODS IN NORTHERN GHANA

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

1. Name and general characteristics of the innovator

The innovator is Ms Neina Naginpoan, a 29-year-old small-scale farmer living with her husband and two children in Bunbonaayili, a rural community in Yendi Municipality in northern Ghana. Besides helping her husband farm and feed the family, Neina prepares and sells a local food called *wasawasa* to schoolchildren and other community members on market days. *Wasawasa* is a common food in northern Ghana and is traditionally made from yam, but Neina makes hers from a mixture of maize flour and powder from the pulp of the *dawadawa* fruit (*Parkia biglobosa*). This makes the *wasawasa* yellowish and slightly sugary, which children and young people in the community like very much. Neina also belongs to the Nandan Marketing and Cooperative Society, a group of 40 women registered with the Department of Cooperatives and engaged in group-based farming, trading agricultural produce and selling cooked food to earn incomes to support their families.



Ms Neina Naginpoan, the innovator (left); wasawasa ready for eating (right) (Photos: Joseph Nchor)

2. Context of the innovation

Yendi Municipality is located about 90 km from Tamale, the capital of the Northern Region of Ghana. The local people practise small-scale farming mainly for household consumption, and sell the surplus for cash to buy other food and non-food items. Crops they produce include maize, sorghum, millet, yams, cassava, beans, soybean and local vegetables. They also raise animals such as cattle, sheep, goats, pigs and fowls mainly for cash to invest in crop farming and for other purposes. The animals are rarely used for food for the household, except on festive and special occasions.

The Municipality lies in the Guinea savanna zone of northern Ghana and experiences a unimodal but erratic rainfall pattern. Crop farming is rainfed in one growing season per year. 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.

By culture, it is not common for women to own land; they are expected to help their husbands work on the family farm. Plots acquired by women to use for their own farming are often less fertile and

may be taken back by their owners after a woman has invested in improving land fertility over years. 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 therefore engage in agro-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.

The meals prepared and consumed in the households usually lack variety and are primarily made up of carbohydrate staples. Partly as a result of increasing population pressure and climate change, the farmers often experience poor rainfall during the growing season, which then leads to poor harvests, food insecurity and malnutrition, especially in women and children.

3. Description of the local innovation

Neina's innovation in food processing involves the preparation of *wasawasa* (a local steamed dish) from a mixture of cereal (maize) flour and the yellow pulp (powder) from the *dawadawa* fruit (*Parkia biglobosa*). She normally steams the mixture for 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 yellow *dawadawa* powder is locally known to be rich in vitamin A and thus enriches the nutrient content of all foods to which it is added. Neina prepares her *wasawasa* as follows:

- She puts water in an aluminium pot and places it over a fire.
- She places an earthenware steaming pot on the aluminium pot and seals them together with maize flour paste or dough.
- She places pieces of sticks across the large hole in the steaming pot to prevent the *wasawasa* mixture from falling into the water in the aluminium pot below.
- She mixes the maize flour and *dawadawa* fruit powder together, sprinkles water on the mixture and stirs continuously to form small but fine grains.
- She slowly scoops the mixture into the steaming pot through the top opening and tightly covers it and seals it with a paste of the maize flour to prevent the steam from escaping.
- She steams the mixture for 15 minutes or until it is cooked.
- She fries sliced onions in vegetable oil and adds them together with some powdered pepper and salt to the steamed *wasawasa* and mixes it with a ladle.
- She then serves the *wasawasa* with *shito* (hot pepper sauce) or stew.

This innovative *wasawasa* dish has become very popular among local people, especially children, and Neina has taken advantage of the growing demand for the dish by preparing and selling it daily in the local primary school and on the weekly community market day. She also serves the dish to her husband and children on an almost daily basis. As her business increased, Neina needed wage labourers: she hired three women to work with her.

Besides providing an alternative source of income, the yellow *wasawasa* improves the nutrition of her children. The *dawadawa* powder, which was little consumed in the recent past in the area, has gained popularity, as has the *dawadawa* tree itself, which is highly protected in the local agroforestry systems. To given 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.

4. Why and how the innovation was identified and selected for joint experimentation

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 Proli-FaNS objectives and the local innovation and participatory innovation development (PID) approach. In order to ensure that women’s innovations were given due attention, the field team formed separate groups of men and women farmers to identify, select 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 multistakeholder platform (MSP) set up by the Proli-FaNS project in the learning site. The criteria were in line with the project objectives to improve food security, address gender inequalities and empower 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 helping to improve the nutritional status and income levels of many households in the community and beyond. Her innovation builds on and fits into existing local diets and food preparation practices, using mainly local inputs that are abundant in the area, and is environmentally friendly. Therefore, it could easily be spread to many other households and communities in the area.

5. Objectives of the PID process

Most of the meals prepared and consumed in households usually lack variety and are made mainly of carbohydrate staples. A nutritionist in the Prolinnova–Ghana technical support team suggested that, if the *wasawasa* made with *dawadawa* pulp could be further improved in its nutrient content through fortification with other ingredients, it might improve the access of community members to more nutritious diets to reduce hunger and improve nutritional status in the households. 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 was constraining Neina’s ability to cook and sell the food to her clients and to maintain a profitable business on a year-round basis. Neina therefore agreed with the field team and nutritionist to engage 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 the preparation of the food.

6. The PID process

6.1 Main activities undertaken

The nutritionist, Ms Gladys Gamor from the Department of Family and Consumer Science of the University for Development Studies (UDS) in Tamale, northern Ghana, facilitated the PID process as co-researcher. She is a member of the Prolinnova–Ghana National Steering Committee (NSC) and technical support team. 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. Because of the popularity of *wasawasa*, still more men and women in the community witnessed and learned about the innovation activities.

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

- Planning and design of the PID process involved the innovator, Proli-FaNS project coordinator, local MSP members, the Prolinnova–Ghana technical support team (including the nutritionist from UDS), EPDRA and local extension staff. They assigned roles to the different actors. The Proli-FaNS project coordinator in ACDEP facilitated the process.
- The innovator Neina, her assistant and relative Nafisa Hardi, the WIAD extension officer and the nutritionist met and agreed on what they would do and what inputs they needed for the experiment. Neina sourced all the ingredients except cowpea leaves from her household stock or on the local market. ACDEP through the local NGO partner EPDRA provided funds to help her buy some of the ingredients on the community market. The cowpea leaves were bought from outside the community (from an irrigated garden) because it was the dry season and this ingredient was therefore not available locally. EPDRA facilitated the provision of the materials/inputs such as equipment for food preparation, selling and eating (e.g. bowls, spoons, tables, seats/benches and a wooden shed in which the food was sold).
- Two members of the Prolinnova–Ghana technical support team who had been trained as PID trainers in Kenya in early 2017 trained the field team and local MSP members in PID. The WIAD extension officer also trained Neina in processing soybeans into flour, measuring the ingredients and presenting the final dish, and also in gender issues and business management. Only women (mainly the innovator and other local women who wanted hands-on training in the process) did all the processing, preparing, cooking and serving of different types of *wasawasa*.

6.2 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 and weigh ingredients and materials for preparing nutritious foods without wasting the ingredients. The experimentation produced different recipes or variants of the meal using different combinations of the main inputs, by adding millet flour to the maize flour and fortifying the food by adding soybean flour to the cereal flour and fresh bean leaves to the *dawadawa* flour to prepare the *wasawasa*. The women also added *dawadawa* condiment to the *shito* (hot pepper sauce) during the preparation. Three types of *wasawasa* were developed:

1) Wasawasa prepared from dawadawa pulp, millet flour and maize flour

The aim was to reduce the quantity of maize flour and *dawadawa* pulp used in the *wasawasa*. The women prepared this variant using the following ingredients: millet flour (800 g), maize flour (200 g), *dawadawa* pulp (200 g), sliced onion (80 g), 1 tablespoon salt, 1 tablespoon pepper, 500 ml water and 375 ml cooking oil. The method used was:

- Put water in an aluminium pot and place it on the fire.
- Place the steamer on the pot and seal them together with maize flour paste or dough.
- Add *dawadawa* pulp to the millet and maize flour in a bowl and mix it well.
- Sprinkle water and continue stirring until the mixture forms small lumps.
- Pour the mixture into the steamer and steam for 15 minutes or until the mixture is cooked.
- Heat oil and add sliced onions until golden brown.
- Scoop the steamed mixture into a bowl and break the lumps with the back of a ladle.
- Add oil, pepper and salt, mix well and serve the *wasawasa* with *shito*.

2) Wasawasa prepared from bean leaves, dawadawa pulp, millet flour and maize flour

The aim was to reduce the quantity of maize flour and *dawadawa* pulp used in the *wasawasa*. The women prepared this variant using the following ingredients: bean leaves (2 kg), millet flour (800 g),

maize flour (200 g), *dawadawa* pulp (200 g), saltpetre (30 g), sliced onion (80 g), 1 tablespoon salt, 1 tablespoon pepper, 500 ml water and 375 ml cooking oil. The method used was:

- Put water in an aluminium pot and place it on the fire.
- Place the steamer on the pot and seal them together with maize flour paste or dough.
- Pound the bean leaves in a mortar, add saltpetre and continue pounding.
- Add *dawadawa* pulp to the millet and maize flour in a bowl and mix it well.
- Add the pounded leaves to the flour mixture and stir to mix it well.
- Sprinkle water and continue stirring until the mixture forms small lumps.
- Pour the mixture into the steamer and steam for 15 minutes or until the mixture is cooked.
- Heat oil and add sliced onions until golden brown.
- Scoop the steamed mixture into a bowl and break the lumps with the back of a ladle.
- Add oil, pepper and salt, mix well and serve the *wasawasa* with *shito*.

3) Wasawasa prepared from dawadawa pulp, millet flour and soybean flour

In this variant, millet flour was completely substituted for maize flour, with soybean meant to increase the protein content. The ingredients that Neina used to prepared the millet/soybean flour *wasawasa* were: millet flour (500 g), soybean flour (130 g), *dawadawa* pulp (200 g), sliced onion (80 g), salt (half tablespoon), powdered pepper (half tablespoon), cooking oil (125 ml) and 500 ml of water. The method was as follows:

- Put water in an aluminium pot and place it on the fire.
- Place the steamer on the aluminium pot and seal them together.
- Put millet and soybean flour and *dawadawa* pulp in a mixing bowl and mix well.
- Sprinkle water on the mixture and stir continuously until it forms small lumps; remove any bigger lumps.
- Pour the mixture into the steamer and cover it with a tight-fitting lid or seal the cover on the steamer to prevent steam from escaping; steam for 15 minutes or until the mixture is cooked.
- Heat oil and add sliced onions until golden brown.
- Scoop the steamed mixture into a bowl and break lumps using the back of a ladle.
- Add powdered pepper and salt and stir to mix well.
- Add oil and stir to mix; serve the *wasawasa* with *shito*.

4) Improving the pepper sauce (shito)

During the joint experimentation, Neina tried making an improved pepper sauce (*shito*) that is richer in nutrients and tastier with an attractive aroma, using powdered pepper (40 g), cooking oil (875 ml), tomato paste (400 g), sliced onions (10 g), ginger (20 g), pounded anchovies (80 g), *dawadawa* condiment (40 g), salt (1 tablespoon) and 130 ml water. The method she used was:

- Heat oil, add sliced onion and fry till transparent.
- Add tomato paste and stir, then add pepper and salt and continue stirring to prevent burning.
- Scrape, wash and pound ginger in a mortar; wash anchovies and add to the ginger and pound them together.
- Add the pounded mixture to the sauce and stir.
- Pound the *dawadawa* condiment until smooth and add the sauce; add a small amount of water to the sauce, stir and leave it to cook.
- Reduce the heat and leave to simmer till cooked and dark brown (not burnt) and serve the sauce with *wasawasa*.

Thus, three *wasawasa* recipes were developed in addition to Neina's original innovation:

- Millet and maize flour *wasawasa*
- Bean leaves *wasawasa*
- Millet and soybean flour *wasawasa*
- *Dawadawa*-pulp *wasawasa* (the original innovation).



Innovator and researchers display wasawasa variants from the experimentation

(Photo: Joseph Nchor)

6.3 Joint assessment of the results of the experimentation

The nutrition researcher collected and analysed data on the products 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 members, local extension staff and the Proli-FaNS coordinator also took part in the evaluation.

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

The feedback received from the community participants included:

- ✓ The dishes made with the millet and soybean flour tasted less sugary compared to Naina's *wasawasa* made from maize and *dawadawa* pulp alone, but children were more attracted to the slightly sugary taste of her *wasawasa*.
- ✓ The dishes with the millet and soybean flour were more sustaining, providing more energy and also made one drink water continuously. They were very appealing and palatable to eat.
- ✓ The seasonal cultivation and supply of bean leaves and other leafy vegetable substitutes will limit the preparation of the bean leaf *wasawasa*. Also, soybeans are expensive in the off-season.
- ✓ The *dawadawa*-spiced stew was very delicious and promoted consumption of more *wasawasa*.
- ✓ The innovator was delighted to see that the additions (soya or millet flour, bean leaves) helped reduce the quantity of the seasonally available *dawadawa* pulp she used 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, and she feeds her family daily with the more nutritious *wasawasa*. She trained four other women, who now prepare the *wasawasa* to feed their families. She has shared her improved *wasawasa* recipes with three communities.

Opportunities identified by Neina, other local women and the nutritionists for further experiments include: i) use of yam, sweet potato, sorghum or rice flour to prepare *wasawasa*; ii) addition of fermented *dawadawa* seed condiment to the *wasawasa* mixture before steaming; iii) use of other locally grown and available leafy vegetables, such as moringa and amaranthus, as substitutes for the bean leaves; and iv) more production and sale of the leafy vegetables, especially during the dry season, as a further income-earning opportunity. Neina has also started to grow beans in the wet season to harvest and use in her *wasawasa*.



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

6.4 Roles played by stakeholders in the PID process

- EPDRA (the local NGO partner), working closely with the MSP members and the ProInnova–Ghana technical support team, facilitated selection of the innovation with farmers, supported planning and design of the PID, and coordinated the process. It provided some inputs and funds from the Proli-FaNS project and ensured effective use of the resources for the process. It supervised, monitored and recorded the activities and reported to ACDEP as project coordinator.
- The Municipal Department of Agriculture (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 ProInnova–Ghana technical support team and local MSP members participated actively and learned in the process. They facilitated the community-level consultations for identifying and selecting the innovation, as well as the planning, design, implementation and monitoring of the PID process. They also helped train other technical support team members, extension officers and other local stakeholders in PID.
- ACDEP with the CP focal person for monitoring and evaluation (Franklin Avorny) and EPDRA coordinated, backstopped and monitored all the PID activities and processes at the learning site. ACDEP also disbursed project funds for the PID process and shared the outcomes with the ProInnova–Ghana NSC, Proli-FaNS project partners in other countries and the donor. ACDEP, EPDRA and the nutrition researcher handled 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 within and outside the community in her innovation and variations on it. Her relatives gave her moral support and encouragement and assisted her during the joint experimentation and the experience-sharing sessions.
- The other innovators identified in the communities as well as other farmers gave support in identifying, prioritising and recommending the innovation for PID and learnt how *wasawasa* could be improved. Community members (men, women and youth) 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 evaluation and acceptability tests, made comments and shared their views on the process and products.
- The nutritionist from UDS was the key facilitator of and co-researcher in the PID process to improve the nutritional value of *wasawasa*, building on the local innovation by Neina. She worked together with women and men in the community in selecting the innovation as a topic for PID. She facilitated the processes of planning and designing the experimentation, including identifying the ingredients and other inputs needed. She gave technical guidance to Neina and the other women during the actual experimentation with different *wasawasa* variants and helped the women measure the ingredients. She facilitated the participatory evaluation in the community to assess and share the outcomes of the PID process. She conducted the sensory, preference and acceptability tests by community members and other stakeholders. As a lecturer at UDS, she supported further validation and wider promotion of the findings by engaging and supervising students working on their theses. She also produced a written documentation on the recipes, food fortification, preparation and cooking processes. She assisted the MDoA co-facilitator and the local innovator in training other women’s group members and in supporting and monitoring dissemination of the PID outcomes. Finally, she encouraged further local innovation and farmer-led joint experimentation by integrating the PID approach into her own teaching and more widely within UDS.
- Two female students in the Department of Family and Consumer Sciences at UDS did their undergraduate theses on PID to improve *wasawasa*. They further validated and promoted consumption of the *wasawasa* products developed through PID, under the supervision of the lecturer in nutrition. They conducted interviews on the *wasawasa* preparation process in the community and on the university campus, assisted in the sensory evaluation of the *wasawasa* variants on campus, and demonstrated the new recipes on campus, thereby promoting awareness and consumption of local nutritious foods, and contributing to institutionalisation of the PID approach within the Department at UDS.

7. Assessment of the PID process

The field team of the local NGO, the Prolinnova–Ghana technical support team and the community members made the following assessment of the PID process:

- The nutrition researcher and innovator agreed on the need for dietary improvement and jointly identified local substitutes and materials for diversifying *wasawasa* recipes in a way that combined local and scientific knowledge about the availability and nutritional value of the components (millet, maize, moringa etc). The researcher and the rural women learned from each other and gained mutual respect for each other’s expertise.
- 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 is possibly also a reason why the local women were so interested in taking up the new ideas for home cooking and income generation.

- Men, Community Chief and elders, schoolteachers and children took active part in the sensory evaluation of the dishes and gave their views and recommendation about the nutritional characteristics, thus showing high interest in the objectives and the outcomes of the PID.
- The farmers saw the PID process as being useful and worth the time they spent participating in the process. They were grateful to the local NGO and ProInnova–Ghana technical support team for working with them, “opening their eyes” and helping them discover the hidden potentials and talents in them.
- The PID process brought the stakeholders closer together and led to the creation of a strong rapport and trust between the farmers and the research/technical team, thus making them all willing to give more of their time and other resources to do similar activities in the future.
- The innovator was proud to be recognised and felt empowered socially, physically and economically; this built her confidence.
- 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.
- However, most community members still did not seem to be aware of their potentials as researchers with abilities and capacity to solve their problems.

8. Challenges encountered during the PID process and these were addressed

The innovator and the other rural women involved in the PID process were illiterate and therefore had difficulty in using the scale to weigh the ingredients and in recording the amount of ingredients used in the experimentation. Faced with this challenge, the nutrition researcher taught the women to use container measures to obtain the same quantities as with a scale instead of the women’s handy measures based on estimations and thus not accurate and reliable. Also, Neina and her cooking assistants started to benefit from evening literacy classes offered by the Department of Non-Formal Education to improve their literacy and numeracy skills of community members.

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

9. Sharing of the experience and results/findings/outcomes of the PID process

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 stakeholders from the Bongo action-learning site of the Proli-FaNS project.

Unfortunately, an intended assessment of the impact of the innovative dishes on the nutritional status of children and women could not be carried out because of resource constraints.

10. Key lessons learnt during the PID process

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

- Engaging with a local innovator in a PID process helps to 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 commitment of these stakeholders and contributed to the success of the project.
- Encouraging the farmer innovator to lead the process helped to build her confidence and that of her peers, since they participated fully and learned 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 purchase materials 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.
- PID processes involving women should take consideration of their time to ensure that the PID does not deprive the women of time for their household chores and other productive roles.

In future, the Prolinnova–Ghana technical team intends to give equal opportunities to all farmers to demonstrate their abilities despite their varying levels of comprehension of the PID process, so that both the fast and the slow learners are included. The researchers will expose the farmer innovators to simple record-keeping and cost-benefit-analysis techniques to enable them to take greater control in recording and analysing their findings when they are exploring innovative activities, especially for income generation.

11. 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 targeted agricultural research and development 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 will 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 intends to mainstream the PID approach into her course curriculum in her department in UDS and also to incorporate the approach and results into her current doctoral research project.

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