



Technical Brief

Positive Potato Seed Selection Training



The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH is Germany's leading provider of international cooperation services. As a federal enterprise, we support the German Government in achieving its objectives in the field of international cooperation for sustainable development. We are also engaged in international education work around the globe. GIZ is fully owned by the Federal Republic of Germany, represented as the shareholder by the Federal Ministry for Economic Cooperation and Development and the Federal Ministry of Finance.

Technical Brief

Positive Potato Seed Selection Training

1. Introduction

The performance of micro, small and medium enterprises (MSME) is important in order to create income and employment in Nigeria. The objective of the Pro-Poor Growth and Promotion of Employment in Nigeria Programme – SEDIN of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) is to increase sustained employment and income generation of MSMEs. The target groups of SEDIN are the owners and employees of MSMEs as well as members of other economically active low-income households. Measures at state and local levels target nine selected states (Niger, Ogun, Plateau, Edo, Lagos, Oyo, Abia, Kaduna, and Kano States). As part of its mandate to improve the income and employment situation of MSMEs, with a special focus on value chains, the SEDIN Programme provides business services to value chain actors. They include management as well as technical trainings, such as trainings for seed sprouting and positive seed selection for potato farmers and their institutions in Plateau State.

Plateau State is the key potato growing area of Nigeria producing over 95% of the total potatoes grown in the country. From a total arable area of 800,000 hectares an estimated 300,000 hectares is under potato cultivation in Plateau, from which most of the producers are small scale farmers, who grow potatoes as a cash crop in 9 out of the 17 Local Government Areas (LGAs) of the State. For these farmers, who farm two hectares or less, the potato crop not only provides their main source of income, employment and livelihood, it is

also their main staple food and source of food security. The potato crop is therefore of strategic importance for thousands of farmers and their families, and the key source of income and employment in the agricultural sector of Plateau State.

The key constraint, preventing growth in the potato value chain, is the unavailability of good quality and clean (non-diseased) seed potatoes. To unlock this potential for growth, the positive potato seed selection training aimed to upscale the proven technology of potato seed sprouting and positive selection, along with key agronomic practices to enable farmers to produce their own good quality, higher yielding, and non-diseased cleaner seed potatoes. It thereby worked through cooperatives and the Solanum Enterprise. The expected outcome of the initiative was to realise increased potato crop yields, incomes and employment with benefits not only to the farmers and their families but to the various actors along the potato value chain and to the rural economy of Plateau State.

2. Objectives of the Training

- To upscale outreach through the cooperatives;
- To achieve a sustainable increase in potato yields, income and employment of subsistence farmers with subsequent benefits to the various actors along the potato value chain;
- Developing seed improvement management systems through positive seed selection and promoting multiple sprouting from improved

seeds as well as farmers' saved seeds;

- To train (empower) farmers and their cooperatives to select the best potato plants in their fields as future seed in addition to improved crop disease management, agronomy and control.

3. Training Concepts and Methodologies

The training was carried out for 5,200 participants between 2018 and 2019 with support by the members of the Solanum Enterprise.

The training was initially developed by the Dutch Royal Tropical Institute (KIT) under the Netherlands Embassy Potato Mission in June 2018 and adopted from the ToT that was attended by the ten Solanum trainers. Its content was decided upon in collaboration with the GIZ SEDIN Potato Value Chain Advisor.

Training of Trainers

In a first step, ten members of Solanum Enterprise were selected to conduct the training, who are also potato farmers and thus understand the dynamics of potato farming, the disposition of the farmers and the challenges of potato farming in Plateau State.

The designated trainers went through a training of trainers' (ToT) and Peer learning workshop to prepare the succeeding training for their fellow potato farmers. The essence of the peer learning was to enable trainers to learn from each other and adopt the methods and learning processes that could best pass the key learning/training messages across to the potato farmers.

Step-Down Training

The step-down trainings for the potato farmers were structured to accommodate 30 participants per class and were carried out in either schools or churches within the communities where the farmers are located for ease of movement, cost minimisation and the maximisation of concentration.

The first phase of the positive potato seed selection training of potato farmers was delivered to 2,200 farmers, out of which 925 were females and 1,275 were males across Barkin Ladi, Bokkos, Mangu and Pankshin Local Government Areas of Plateau State. The training started in December 2018 and ended in February 2019, with a total of 74 three-day trainings delivered. The second phase of the positive potato seed selection training of potato farmers was carried out in the second quarter of 2019, comprising 3,000 farmers (1814 males and 1186 females).

The farmers were expected to make some contributions to the training, including the venue for the training, writing materials, and cooked potatoes for feeding at the training. The classroom venues were located near a potato farm for easy access for the practical field training sessions.

Each class lasted for three days with the addition of practical sessions on the farm on the third day. The training comprises of three modules: positive selection, Disease control and seed sprouting. The seed sprouting module was added to the training material as it is the most relevant challenge in increasing yields of potato producers.

The trainers adopted the use of lecturing/teaching, group discussions, question and answer sessions and other interactive methods. They used visual aids

and practical/field demonstrations for the delivery of the training.

Class Room Sessions

The methods used in the classrooms incorporated lecturing/teaching, group discussions as well as question and answer sessions. This was to add to farmers' knowledge on good seed sprouting, potato diseases, and proper use of crop protection products.

The following are some of the theoretical lessons learnt:

- The size of land does not guarantee proportionate yield when the potato is infected by disease;
- Profit realised by potato farmers is influenced not only by crop yield, revenue and expenses, but by where and when the potato is sold;
- You do not need to use a large farm to get higher yields but the application of knowledge of the positive selection, seed sprouting and potato diseases;
- Potato diseases can become resistant to chemicals as time progresses, therefore the need to continue to upgrade knowledge on how to combat emerging potato diseases;
Positive selection of seeds that have been consistently recycled will not guarantee sustainable higher yield.

Practical Sessions in Farmer's Field

The same topics discussed in the class room sessions were also set out at the practical sessions so as to link what was learned in the class room with the realities on ground. The farmers were able to identify diseased plants in the field, select the best plants to save as seeds, and subsequently carry out proper seed sprouting to increase potato yields.

Generally, the methodology adopted was participatory and this was critical in the achievement of success. In addition, the application of hands-on methods, where the trainees were actively involved in their own learning, provided considerable adaptation and remarkable impact. Therefore, the training has become a fascinating subject among potato farmers.

Participatory Methodology

The participatory methodology adopted was critical in the achievement of success. In addition, the application of hands-on methods, where the trainees were actively involved in their own learning, provided considerable adaptation and remarkable impact. Therefore, the training has become a fascinating subject among potato farmers. Moreover, the training approach used for the positive potato seed selection training stimulates confidence and creates a not-to-hostile environment for the learners. Farmers feel comfortable learning from a co-farmer who understands their nature and fully appreciates the contextual issues that are associated with the kind of farming they engage in.

Composition of Participants

A total of 2,200 farmers participated in the first phase of the training from four potato producing LGAs of Plateau State, while 3000 participated in the second phase from the remaining five potato producing LGAs.

Eligibility Criteria

The farmer's eligibility for participation is centred on membership of any of the potato farmers' cooperatives under the Solanum Enterprise. Every class was gender-sensitive and did not exceed 30 participants shared among the gender divide.

4. Description of Workshop Processes

The trainings did commence with the setting up of an enabling climate for the participants to effectively participate. Therefore, they were asked to give the first shot at the training through self-introduction. The technical sessions started with an introduction of seed sprouting and seed quality management that is needed to attain higher yields. Thereafter, the other topics on pests, diseases and how to combat them were giving some depth of attention.

Highlights of Day 1 – Seed Sprouting

This topic on seed sprouting was taken at the beginning of the training to stress the fact that a series of activities is needed to attain higher yields, and the first step is having a good sprouted seed.

Seed sprouting has a great influence on potato yield but most of the potato farmers have no idea that breaking the topmost sprout stimulates other potato eyes to sprout. From past practices, it has been observed that farmers are always in a hurry to plant, once the sprout at the top shoots has appeared. This is because of little or no knowledge of the fact that multiple sprouts of three to five will produce more plant stems and each stem will produce its own family thereby guaranteeing increased yields.

To set the tone for this session, participants were asked to describe a good seed potato. After a round of responses, the trainer explained to them what a good seed potato is. It is a seed that has eye spots; it is free of diseases; it is of good size and has strong sprouts. Properly sprouted seeds were brought to the training venue by the farmers to complement the pictures on the banners

and learning materials so farmers could see and relate with the pictures on the banner and the learning materials and hand-outs. A large banner was used to explain what proper seed sprouting signifies.

For potato disease management, the participants were required to point out what they know about potato diseases that affect the potato when being planted or harvested. Afterwards the trainer also explained the potato diseases and spoke about the dangers of planting diseased potato and single sprout potato which can lead to the degeneration of seeds and consequently low potato yield.

Highlights of Day 2 – Disease Dynamics & Safety Precautions

The second day exposed the participants to bacterial wilt and disease dynamics. It discussed issues such as the characteristics of an infected potato plant with bacterial wilt; how it spreads and how it can be managed were highlighted. Participants were shown the nature of bacteria wilt in potato fields.

Another topic discussed on the second day is virus diseases. The farmers discussed features of potato viruses and how they could be reduced to minimise their effects. Participants were shown some virus symptoms, such as leaf roll, mosaic, erectness and dwarfing multiple symptoms.

A flex banner contained the picture of the various virus symptoms and the trainer used it to explain the several viruses one by one. The trainer further stressed that farmers should make good use of the training hand-out to help them identify virus symptoms so as to select their seeds well.

After the identification of viruses, the topic on positive selection was presented to the participants, which requires the appropriate selection of healthy plants as seed potato.

Minimum safety precautions in spraying and the practice of safe and effective use of pesticides also featured in the second day of the training. The importance of wearing the complete kits for spraying and the need to follow instructions on spraying chemicals was emphasized by the trainers. One of the farmers was asked to wear the complete spraying gear to demonstrate to his peers how they need to protect themselves and their families from harmful chemicals. They were also advised to wash knapsack sprayers with water before removing protective clothes. Also, they were instructed to keep all chemicals away from human contact.

Highlights of Day 3 – Field Demonstrations

The third day was reserved for field demonstration where the farmers' assignment was, among other things, to scout for infected plants and identify virus disease in the field. The farmers had to identify the various signs/symptoms of blight, bacterial wilt and viruses and tied ropes or coloured material around the plants. They would then call the trainers' attention and the other groups to see and discuss the plants that were marked.

The participants also removed wilted plants and put ashes in the holes and covered them. A glass of water was used to demonstrate the presence of bacteria in the wilted plants that were removed during the field sessions.

Another aspect of the field exercise was to carry out positive selection of potatoes on

the farm through the recognition of healthy plants with the following characteristics: large plant, many stems, deep green colour, and absence of virus symptoms.

The next step was the selection of healthy plants from a potato field. Participants were shown how to select healthy plants, pegging coloured rope or plastic bags, ribbons, sticks, etc. For deselecting a potato plant that have been positively selected and pegged, because of the presence of bacterial wilt, participants were told that they could check pegged plants between two to four weeks.

Trainers divided participants into five groups for the purpose of this aspect of the field demonstration. Each group identified ten plants with virus symptoms; and then discussed the symptoms identified with other groups. Each group also identified 50 healthy plants. After that, the groups were then brought together to further discuss their findings.

The participants were advised that at harvest, they should select best tubers and reject malformed or small tubers. Equally, they were told that the pegged plants can be planted side by side with unpegged plants on the same field to compare results. A volunteer was then asked to wear the protective gear and demonstrate how to spray a potato field with water. Participants also demonstrated how proper spraying should be done by wearing the protective gear correctly, and spraying fungicides.

5. Required Resources

Training Materials

Training materials used for the training includes posters, handouts (fliers), sprouted potato seeds, knapsack sprayers, systemic and contact fungicides, spraying protective equipment (PPEs), coloured rope and plastic bags, flip chart papers, markers, sticks and glass. There were also 40 banners (for trainers); and 6,000 leaflets (for participants).

Financial Resources

- Pre-training sensitisation of Solanum and cooperatives in the nine LGAs (snacks and drinks);
- Peer Learning training for the ten potato farmers/trainers who attended the ToT on Positive Seed Selection (lunch).

Costs for Ten Trainers

- Trainers allowances;
- Transport & communication, (mobilisation, creating awareness, planning and fixing dates and venues as well as farms for practical sections and follow up after training before & after each training);
- Accommodation;

Food & Location

Potato based meals were served during the training which were provided by the farmers. Each trained group/class was responsible for securing their training venue and locating at least six weeks old potato crops for the practical field exercises.

Total cost of the Training

The cost of training 5,200 potato farmers was 24,999,961 NGN. The cost per capita is put at, approximately 5,800 NGN.

6. Lessons Learnt

- The results achieved by those applied the knowledge acquired have also motivated those who attended the training and have not applied the knowledge and skills to do so;
- Learning under a fellow farmer provides a not-to-hostile atmosphere for learning;
- The closeness of learners and trainers encourages continuous learning, where the learner has the opportunity to continuously consult with the trainer, in the event there are areas that need clarification in respect of what has been taught;
- The knowledge of agro-chemicals' effect on potato diseases has created avenues for some of the cooperatives to embark on the sales of agro-chemicals;
- The use of local languages was necessary, in most places to ensure proper communication and understanding of the training;
- Controlling disease in the informal system is fundamental because farmer-farmer exchange of seeds could be counterproductive if the seeds are diseased.

7. Success Stories and Testimonials

General Picture

The positive potato seed selection training stands out as the most transformative of all the trainings the potato farmers have participated in, even though previous trainings have set the tone for good agricultural practices. It is evident that the dwindling pull towards potato farming has been given a boost by this training because farmers, who had almost disregarded potato farming, have regained their

passion. Evidentially, some have even expanded their potato farming business. The damages caused by the blight invasion used to be immense to many farmers, who for countless seasons either got marginal yields or nothing at all. After six months, from the time the positive potato seed selection training was held, the tides have favourably turned for potato farmers. This is because there is growing positive results in the areas of income, employment and yields.

The average business revenue for the potato farmers, as found from this second evaluation 6 month after training, is 349,350 NGN; that is, 143,165 NGN higher than the previous result (69.43% increase) from the first evaluation. The average business revenue for female potato farmers is 288,133 NGN; an upsurge of 122,857 NGN (74.33% increase).

Expenses rose higher than the previous one with average expenses of 116,007 NGN recorded by the farmers after the second evaluation. The increase in expenses, as stated by some farmers, is the result of the expansion in the hectares used and the application of recommended agro-chemicals by the potato farmers. The average expenses for female potato farmers is 98,591 NGN, an addition of 13,763 NGN (16% increase) on the previous average expenses.

In the end, profit has increased with an average business profit of 233,648 NGN, which is 96,912 NGN above the former average profit (71% increase). The average business profit for females is 189,779 NGN; an improvement of 109,094 NGN from the last one (135% increase).

Generally, there is an increase of 30.11% of hectares used by farmers to produce

potatoes. However, the hectare per individual farmer from the first evaluation is 0.62 ha while for the second evaluation is 0.78 ha, a 25.81% increase. The increase for male potato farmers is 30.65% while for the female potato farmers is 19.67% increase of hectares for potato production.

An average of 2.43 tonnes of potatoes is produced per hectare by all potato farmers; 0.06 tonnes (2.5%) higher than the one recorded in the first evaluation. Female potato farmers' average tonne per hectare is 2.27 tonnes; 0.26 tonnes (12.9%) higher, when compared with the percentage from the first evaluation.

It is interesting to note that the knowledge acquired by the farmers have had some multiplier effects on other crops. Some farmers have applied seed selection to their tomato farms and that has greatly impacted the tomato farming practices of the farmers.

Personal Results

Pursuit for Results by Damjik

Immediately after the positive potato seed selection and seed sprouting training, Damjik made approximately 25 tonnes per hectare; employed a permanent employee, hired 20 workers (15 males, 5 females) and has more unpaid hands working for him: seven altogether (five males, two females); making an enormous sale of 5,625,000 NGN.

“If you do proper seed selection, you will get better yield and if you allow the potato to sprout more, then the yield will be greater.”

Later, he planted two varieties of seed potatoes, Connect and Marabel, and he harvested 68kg of Connect and 65kg of

Marabel per 25 m² respectively. When this is calculated per hectare it will be equal to 27.2 tonnes per hectare. That is a further increase of 2.2 tonnes of potato.

Renewed Hopes for Davou

His yield per hectare that ranged from 0.25 to 1 ton of wretched-looking potato was a source of discouragement. The poor yield could hardly fetch him 20,000-30,000 NGN in income.

“Without remedy for the late blight and adequate access to good seed potato, planting potato would have been a waste of time and financial resources.”

The positive potato seed selection has led to the production of over 3 tonnes of potato which is 300% of what he had gotten previously. Making profit from potato production was like a mirage before the training and as earlier stated, however, he could get 20,000 - 30,000 NGN as income. The profit he made from the sales of potato, after the training, is more than 1,000% of the income he had gotten for some time.

Increase in Yield, Income and Employment for Bitrus

From 0.6 ha of land, what he got was an average of 50 bags (2.5 tonnes) of inferior sizes of potato. He made an average of 150,000 NGN - 250,000 NGN. However, that did not translate into better profit and therefore, he struggled to pay school fees and to handle the upkeep of his family. The emergence of late blight further reduced his potato yield and there was a season he did not have anything to harvest.

“I used to suffer seriously from farming potato; and as a result, the payment of school fees for my children was a major challenge but this time around I have paid with ease.”

After the training, he was able to produce four tonnes of potato which is above the average yield per hectare of potato in Plateau State. He made about 2 Mio NGN as income, has employed 15 workers, including nine female workers.

Positive Seed Selection Leading to a Positive Reality for Moses

He had less than one hectare to farm potato, which could fetch him nothing more than 50,000 NGN. After the training, he expanded it to two hectares. From his two-hectare-sized potato farm, he got the potato yield he has never gotten as a potato farmer.

“As a retiree, I now live happily with my family, not like other retirees who are at the mercy of pension from the government.”

The farm produced 10.25 tonnes of potato with a turnover of 1,845,000 NGN. After the deduction of expenses, he realized a profit of 1,343,500 NGN. He has increased the number of people who work in his farm from 15 to 30 with a 300% increase in the number of females that work in his farm.

8. Recommendations

- The positive potato seed selection training should be made an integral part of the mandate of the Solanum Enterprise. Therefore, chairmen and secretaries of unit cooperatives should be trained to serve as coaches and mentors to their members;
- Solanum should provide an alternative supply base for agro-chemicals or encourage cooperatives to do so, allowing farmers to easily access better quality and suitable chemicals for their potato farms;
- Every group/cooperative should have a demonstration farm for continuous application, observation and adoption of best practices on positive selection;
- Solanum could have a farm as a major demonstration farm that the farmer groups can visit and adopt best practices. This could also serve as a means of generating revenue that will help strengthen the Solanum Enterprise;
- Officials of Solanum and the farmer groups should visit farms to observe and monitor whether farmers have adhered to the practice change;
- For sustainability of the programme, more awareness should be created on the importance of positive selection in potato production;
- In order to fully achieve the aims and objectives of the training, more potato farmers should be trained;
- Since virus diseases and bacteria wilt do not presently have cure, agro-allied input providers should channel their energy towards addressing this major challenge;
- Refresher trainings should be organised periodically for the trainers to keep them up-to-date;
- Continuous sensitisation of other farmers through benefitting cooperatives on this programme should be intensified;
- Trainers should be encouraged to do a follow-up in all places where training took place to give farmers a sense of belonging;
- Farmers should be encouraged to share ideas with their colleagues during their LGA topic days, where they usually discuss pressing issues, and challenges that concern the potato farmers; it is also a platform for inviting input suppliers other service providers and stakeholders to discuss products, crop protection, solar or drip irrigation, and anything that comes up for discussion;
- For sustainability of the programme, farmers with a consistent approach to the adoption of good practice should be identified and recommended as good source of seeds for potato production for other potato farmers;
- Farmers should be assisted by identifying markets for off taking of both ware size/seed potatoes;
- Input service providers, especially chemicals, should be identified for collaborative efforts towards addressing identified diseases;
- Serious or effective farmers towards adoption of this programme should be identified and encouraged;
- Sharing of experiences and lessons during farmer topic days in each LGA should be encouraged.

Published by

Pro-Poor Growth and Promotion
of Employment in Nigeria Programme - SEDIN
20-22 Haile Selassie Street
Abuja, Nigeria
www.sedin-nigeria.net

Author

Simon Suwa

Responsible

Detlev Holloh
Head of Programme – SEDIN

Editor

Jana Röthlisberger
Junior Advisor, Communication

Photo credits

All photos are owned by GIZ SEDIN

Abuja, March 2020



Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Sitz der Gesellschaft
Bonn und Eschborn

Friedrich-Ebert-Allee 36 + 40
53113 Bonn, Deutschland
T +49 228 44 60-0
F +49 228 44 60-17 66

E info@giz.de
I www.giz.de

Dag-Hammarskjöld-Weg 1-5
65760 Eschborn, Deutschland
T +49 61 96 79-0
F +49 61 96 79-11 15