COLLABORATIVE SEEDPROGRAMME
Nigeria-Netherlands

Challenges to Adoption of High-Quality Seeds of Modern Tomato Varieties in Northern Nigeria, Implication for Extension

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EXECUTIVE SUMMARY

The purpose of this study is to better understand the barriers of adoption of quality seeds of improved varieties by farmers in 5 LGAs in Kaduna State and provide recommendations on how to enhance extension messages to align better to needs and struggle experienced by vegetable farmers.

Focus group discussions were organized involving 85 vegetable farmers. A scan of the challenges to adoption of high quality seed is provided as well as key recommendations are formulated.

KEY CHALLENGES

What are major challenges faced in sourcing and using seeds of modern varieties in the 5 communities?

The high costs associated with purchasing seeds, as well as the expenses related to inputs like fertilizers and pesticides, present a significant obstacle to adoption. For many farmers, affording these high-quality seeds and the necessary inputs is challenging.

Pest infestations create hurdles for the adoption of high-quality seed varieties. These challenges often lead to farmers abandoning their initial choice and transitioning to more affordable varieties that demand less intensive management.

Farmers often experience delays in receiving timely follow-up extension visits. This delay in support significantly impacts their motivation and willingness to continue using the chosen variety.

High-quality seeds are frequently unavailable in local agro-dealer shops at the right time, particularly during the commencement of the planting season. This situation prompts farmers to switch to the available varieties out of necessity.

The quantity of seeds in packages/containers influence the selection of what variety to use . Farmer prefer to use varieties that come with a package containing more seeds.

KEY RECOMMENDATIONS

How could extension information material be better designed to serve farmers and lessen their constrains in adopting high quality seeds?

Improve timely supervision and extension visits

Establish a reward system for key farmers

Offer bundle options to ease financial burden

Employ more field officers from the community

Leverage communication channels for information dissemination

Incorporate more pest management guidance in extension messages

COLLABORATIVE SEEDPROGRAMME

Executive summary

This study delves into the investigation of the key challenges that hinder the adoption of high-quality seeds of modern tomato varieties in Northern Nigeria, specifically in five Local Government Areas (LGAs) of Kaduna State: Sabon Gari, Soba, Makarfi, Kaduna, and Zaria. The research involved five focus group discussions, with a total of 85 participants, including 25 key farmers. The study addressed two key research questions:

Research Question 1: What are the major challenges faced by farmers in the adoption of high-yielding tomato varieties?

Research Question 2: How could extension information material be better designed to serve and alleviate the constraints faced by farmers in adopting high-quality seeds of modern varieties?

Here below are highlighted the major findings:

High costs of seeds and inputs: One of the primary challenges faced by farmers is the high cost associated with purchasing high-quality seeds. It's not just the seeds; the cost of required inputs such as fertilizers, pesticides, mulching materials, and seed trays also poses financial burdens. These high costs can discourage continued adoption of modern varieties, especially among smallholder farmers with limited financial resources.

Availability issues: Availability of high-quality seeds is a significant concern, with a lack of seeds in the outlets present in farming areas. As a result, interested farmers often have to travel long distances to urban centers to access these seeds. When the seeds of the preferred variety are not available, farmers switch to the variety that is available at the shop or go back to the variety used in the past.

Pest management challenges: Pest management, particularly the threat posed by *Tuta absoluta*, was identified as a serious issue by farmers. They expressed difficulties in effectively dealing with pests, even after receiving training. The struggle with pest control often leads farmers to switch to varieties that require less management and are more cost-effective, as they perceive pests to affect all varieties.

Role of extension services: Extension services were found to play a dual role in both driving and hindering the adoption process. Training sessions and radio channels were identified as effective means to increase awareness and encourage adoption. However, there were challenges related to the timing of extension provision, a lack of feedback mechanisms after training, and unprepared extension officers, which hindered the adoption process.

Several recommendations on how to enhance extension services to address these challenges are provided. These are: Strengthen the outreach of extension messages, particularly through radio and posters. Integrate and provide guidance on pest management and control through extension messages, training sessions, and demonstrations. Enhance bundle options to ease the financial burden on farmers, possibly offering packages that include seeds, fertilizers, and pesticides. Establish a rewarding mechanism for key farmers who can serve as advocates for farmer-to-farmer training, thereby enhancing knowledge dissemination within the farming community.

Background and research questions

Indicate the research questions that will be answered. These relate to the objectives of the research.

The purpose of this study is to gain a deeper understanding of the obstacles preventing vegetable farmers in five local government areas of Northern Nigeria, specifically in Kaduna State, from adopting high-quality seeds of improved varieties.

The study has two primary objectives:

The first objective of this study is to identify the barriers that hinder the adoption of high-quality seeds of improved varieties in these communities. The research will focus on understanding the major challenges farmers face in sourcing and using these improved seed varieties. This objective addresses several aspects related to the adoption process, including availability, affordability, adaptability, utilization, extension services, and marketing. The central research question for this objective is as follows:

Research Question 1: What are the major challenges faced by farmers in the adoption of high-yielding tomato varieties?

The second objective of this study is to gather crucial insights that can be instrumental in improving the current extension materials and training delivery methods. The aim is to align these resources more effectively with the emerging needs and challenges experienced by vegetable farmers. This objective aims to address the following research question:

Research Question 2: How could extension information material be better designed to serve and alleviate the constraints faced by farmers in adopting high-quality seeds of modern varieties?

Methodology

Give an explanation of the methodology to be used in this action research. Also indicate where the research will take place.

The research followed a Focus Group Discussion Design to explore the challenges limiting the adoption of high quality seeds of high yielding varieties. FGD was selected as a suitable method that allows the researcher to engage with respondents of diverse background on issues or matters of mutual interest. In FGDs, participants are afforded the opportunity to express their concern/frustration or even challenge others' opinions or ideas in a pointed fashion.

The FGDs was carried out in the 5 LGAs where the survey was conducted. 17 farmers per each LGA were invited with a total number of 85 farmers reached (17 * 5 = 85). Focus groups in each of the 5 LGAs comprised 3 sub-groups of participants divided into three categories - 5 Key farmers, 6 Neighboring farmers and 6 distant farmers- per each LGA. The key farmers were selected randomly from a list of trained farmers under SDG project by East west seed. We used google map to select the spatial distance and identify communities that form the distant farmers (> 3 km from key farmer) while those close by the key farmers were identified as the neighbors. A series of questions, covering the two aforementioned major themes guided the discussions.

The entire data collection processes lasted 2 weeks, from 10th of July to 24th of July. Focus group discussions were facilitated by ten enumerators, students from Ahmadu Bello University, Zaria, Nigeria, which in pairs of two (one note taker and one moderator), ran the FGD in the five (5) communities. Each FGD lasted for an average of 1hr 20 mins. From the conversation 5 different reports collecting key information were developed by the enumerators. The information on the reports were further analyzed and synthesized. This reports the result of this second step of analysis, presents which key take aways are elaborated and recommendation proposed/formulated.

Key findings

This chapter delves into the key findings of the study and is divided as follows. First, it illustrates key themes that emerged during the FGD and which were identified by the respondents and attendants to the FGDs as major challenges in adopting high quality seed of modern tomato varieties (taking into account availability, accessibility, affordability,

adaptability, use and marketing). The second part lingers on evidence of the findings that are intrinsically connected within the theme of extension.

Pest and disease management

Pest and disease management emerged as a shared concern in all focus group discussions across the five Local Government Areas (LGAs). Every interviewed farmer recounted substantial losses attributed to pest infestations. The primary culprits were *Tuta Absoluta* (commonly known as Sharon), termites, worms, larvae, ants, and root rot (referred to, locally in Hausa language, as '*Bugau'*). These issues afflicted all tomato varieties indiscriminately. The predicament of pest management and control was not confined to a particular LGA; it was a pervasive challenge across all of them.

Arguably, the focus group discussions underscored the prevalent inadequacy among farmers in addressing pest-related problems, thus emphasizing their unpreparedness to tackle emerging pest issues. The interactions unveiled a wide array of methods employed by farmers to combat pests. Among the common practices, farmers employed a mix of pesticides and chemicals interchangeably. Farmers mentioned different pesticides and the names of those were transcribed in a phonetic way without checking if those were the same as the official brand names under which the pesticides are sold. Some utilized multiple pesticides like Matex pesticide, Sun Bush, and Tihan *(Spirotretamat 75g/l + Flubendiamide)*. Others incorporated Fruna to enhance flowering and yield. Some opted for local remedies, employing neem cake and neem oil in addition to Sharp Shooter *(Profenofos 40% + Cypermethrin)* and Frava powder. A few resorted to burning maize stalks on the soil for soil sterilization and used Klin detergent. In contrast, others suggested spraying Caterpillar force *(Emamectin benzoate)* in combination with Z - force *(Mancozeb 80% WP)*. Certain farmers turned to Emforce pesticide for leaf folding, incorporating Sharp Shooter *(Profenofos 40% + cypermethrin)* and Tihan *(Spirotretamat 75g/l + Flubendiamide)*. powder. However, it became apparent that these methods yielded ineffective results for the majority of cases, as the farmers attested. The issue persisted, especially with *Tuta absoluta*, despite attempts to alleviate it. While Tihan did mitigate the problem to some extent, it failed to provide a comprehensive solution. In general, farmers concurred that Sun Bush and Karate *(Lambda-cyhalothrin 5%)* were more effective pesticides, albeit considerably more expensive.

Pest management significantly influenced adoption decisions. In some cases, farmers discontinued using certain tomato varieties due to their susceptibility to higher infestations. The decision to discontinue was also linked to the increased costs associated with management and production. These farmers instead opted for more affordable varieties, as the pest issues

were uniformly affecting the varieties used. As one farmer expressed*, 'We face the same challenges with tomato production – Tuta Absoluta (Sharon) and 'root rot (Bugau) – in our different fields, regardless of the tomato variety used. Even after using Tihan, which proved ineffective, I decided to stop using the variety I was using before.'*

Interestingly, some farmers perceived new varieties as potential threats, while others viewed their introduction as the onset of new problems. These perceptions played a role in their choices of tomato varieties, as illustrated by one farmer: *'Sharon has posed a major challenge to our tomato farming. I noticed that it became problematic following the introduction of these hybrid varieties. This could be a real issue'*

Perceptions on quantity of seed in seed containers.

The perception by farmers of the quantity of seeds in a seed container can significantly impact a farmer's decision to adopt or not adopt a specific seed variety, highlighting the role of these perceptions in the non-adoption of certain varieties. Arguably**,** the decision-making process for some smallholder farmers when it comes to selecting seeds is not solely based on factors like yield, taste, and color. The responses from these farmers suggest that non-adoption of certain seed varieties can often be linked to their perceptions of the number of seeds included in a seed package. One farmer's experience exemplifies this:

"When you compare Rio Grande, Griffaton and Padma, there's a noticeable difference. Padma is more expensive and contains fewer seeds, whereas Rio Grande and Grafton, which are more budget-friendly than Padma, comes with a higher quantity of seeds. Initially, when I started using Padma, people criticized me, saying that I was wasting money on an expensive variety with only a few seeds. I endured their insults, but when they witnessed my bountiful harvest, they commended me, suggesting that I'd performed some sort of ***magic*** *('ka yi tsafi') due to the exceptional yield I achieved despite the smaller seed packet." (Soba, key farmer (KF) 5)*

This hesitancy to adopt specific varieties based on seed quantity is a recurring theme among farmers. As another farmer explained, the choice of adopting a seed variety is based on factors such as "strong vigor, plentiful yield, a significant number of seeds in the container, and reasonable pricing compared to others." This highlights how the perception of a lack of seeds can deter adoption. Similarly, other respondents emphasized key characteristics they considered when selecting seeds: "high yields, an abundance of seeds in the container, attractive fruits, and good market value." They also noted that when compared to other

varieties, some improved varieties had fewer seeds and were more expensive, leading to non-adoption.

Availability

Availability to high-quality seeds is a pressing challenge for farmers in the area. Many respondents from the communities express their frustration over the unavailability of desired seed varieties in local agro dealers during the onset of the planting season. This scarcity of high quality seeds of improved varieties adversely affects smallholder farmers. In most cases, farmers have to rely on company agents to secure the specific variety they desire, but even this route is not without its drawbacks. At times, company agents are not responsive, resulting in delays that disrupt the planting schedule. One concerned farmer voiced this issue, saying, *"The variety (Platinum) is unavailable, so we have to seek out the company's agent because it's not in the agro dealer's shop."* Another farmer added, "*Accessing the desired variety is a challenge for me. I have to follow up with calls to an agent or field officer before I can obtain it. This unavailability leads to delays that could impact our planting time."*

For many smallholder farmers, accessing seeds requires traveling long distances to urban areas where seed dealers are concentrated. However, this journey often comes with uncertainty, as these farmers revealed: "*The varieties I use are more expensive compared to others and are not available in agro dealers' shops. Most times, I have to travel about 43km from Soba to Zaria before I can obtain them, and there's still no guarantee of availability."*

The unavailability of specific seed varieties, especially at crucial planting times, is a significant factor contributing to non-adoption and leading farmers to switch to more accessible and reliable options. The lack of availability and the associated challenges had led to a shift in seed choices. One farmer switched from using Padma to Rio Grafton, citing the expense and unreliability of Padma's availability as reasons for the change. Another farmer explained: *"I used Diva once but stopped due to the variety's non-availability in the market"* Another one added, *"Padma F1 and Platinum F1 are not available in the market when we need them, so we have to use the available varieties such as Grafton."* Availability issues prompted another farmer to return to previously used varieties, stating, *"I went back to the variety I was using before because Padma F1 was not there".* Seed companies that import these varieties have to be consistent in ensuring availability of supply for sustained adoption.

Affordability of seeds and other inputs

The cost of high quality modern/improved tomato seed variety is an obstacle to adoption. Smallholder farmers who are interested in adopting high quality seeds often encounter a significant hurdle in the form of raising enough funds to purchase them. Interviews and focus group discussions with farmers strongly indicated that affordability remains a key obstacle to accessing high quality seeds. Many respondents pointed out that they couldn't use certain varieties, such as *Padma F1*, due to their high cost.

Others argued that securing high quality seeds comes with substantial financial implications, not only concerning the cost of the seeds but also due to the additional materials required to implement good agricultural practices. These improved varieties demand careful attention and management, which adds to production costs. The increased efforts in care and management also play a significant role in the decision of whether to adopt a particular variety, as one farmer shared*: "I used the 'Platinum variety' before, and it was of high quality, but it required a lot of care and time for management, in addition to the higher cost compared to other varieties. Furthermore, the variety was not readily available in the market and was also affected by Tuta absoluta (Sharon)."*

Participants in these discussions raised concerns about the high cost of fertilizers, pesticides, and other materials, including the availability and supply of items like seed trays. These concerns collectively emphasize the financial and logistical challenges that farmers face when considering the adoption of improved seed varieties. They grapple with not only the costs of seeds but also effective pest and disease management strategies. Some farmers stressed the expense and scarcity of plastic mulch, which is essential for weed control and moisture retention. *"The plastic mulch is expensive and hard to come by, and even finding the grasses used for mulching can be challenging."* These additional costs and resource scarcities compound the financial burden on farmers, making the adoption of improved seed varieties even more challenging.

Extension

The adoption of high-quality seeds of modern varieties among smallholder farmers is significantly influenced by extension services, which encompass training and the use of radio channels to disseminate essential information. These services play a crucial role in not only introducing farmers to these high quality seed varieties but also in maintaining their continued adoption.

Training: Training was found having a profound impact on the adoption process for farmers. It played a dual role, firstly by creating awareness of high quality seed varieties and secondly by motivating farmers to continue using them. The training package itself is considered valuable, particularly when it incorporates lessons on Good Agricultural Practices (GAP). Farmers appreciate training that offers insights on proper nursery management, fertilizer application, and disease control. For example, a farmer mentioned, *"I have been using the variety before the training, but when I saw how it was used at the training, particularly in the nursery, fertilizer application, and disease control, I felt more motivated to continue."*
Another farmer highlighted the benefits of training, saying, *"I learned about better planting times and techniques. I even learned to burn maize stalks in the farm for sterilization. Before, we invested a lot of effort and resources and received little profit, but with the training, we have been able to make more profit."* Moreover, some farmers were motivated to adopt the variety after receiving a free sample during the training. As one farmer put it, *"The company gave a sample for us to test as a trial, after which I adopted it."*

Direct supervision and follow-up extension visits: Post-training, direct supervision and frequent follow-up extension visits were found to be highly relevant in the adoption process. Some farmers reported receiving this support, with one stating, *"I make use of Padma because it's profitable for my business, and the East-West Seed officer who introduced me to the variety always comes to supervise my farm. Even when I face any problem, he is always there to assist me, which keeps me motivated."*

However, the widespread availability of such support is inconsistent. Some farmers lamented that one-time training at the beginning of the planting season is often insufficient to equip them to handle the challenges faced during the harvesting season. Farmers expressed concerns about the timing of extension visits, noting that trainers don't always respond promptly. There is often a delay in providing information about improved agriculture, which is usually received mid-season or towards the end of the season. This delay can hinder the farmers' ability to address issues in a timely and effective manner.

In summary, while training and extension services are instrumental in introducing and motivating farmers to adopt high-quality seed, there is room for improvement in terms of the timing and frequency of extension visits, as well as the sustainability of support beyond initial training.

The role of radio in disseminating information: The use of radio as an extension tool was found also a critical component in supporting farmers in their choice of seed varieties. Farmers often first hear about these varieties and get advice through radio programs. Insights from the study indicated that radio channels, such as FRCN (Federal Radio Corporation of Nigeria) and BBC Hausa, play a pivotal role in disseminating information about high-quality seeds, including their availability and Good Agricultural Practices (GAP).

One farmer emphasized the role of radio by saying, *"I listen to FRCN on Thursday and Sunday to learn more about the training and the variety."* Another farmer echoed this sentiment, stating, *"A field officer from EWS told me about it, and I listened to FRCN to learn more about the seed."*
These findings highlight that Radio programs provided farmers with a valuable platform to access information, making it an essential part of extension efforts, demonstrating the significance of utilizing widely accessed communication mediums to provide farmers with timely and relevant information about high-quality seed varieties and best farming practices.

Recommendation

This chapter outlines several key recommendations to improve extension services and enhance the adoption of high-quality seeds, in light of the constraints highlighted in the former section. Along with the highlights of several hurdles impacting adoption of high-quality seeds of modern varieties, the study raised questions and concerns about the effectiveness of one-time training provided by the SGD programme. These recommendations collectively aims to address the financial, knowledge, and support barriers that hinder the widespread adoption of high-quality seed varieties, also suggests a need for further exploration in the realm of extension methodologies to enhance adoption.

Incorporate more pest management guidance in extension messages:

The study reveals that farmers express a need for better guidance on pest and disease management, specifically regarding pests like *Tuta absoluta* (Sharon) and 'root rot'.

- Extension messages should offer detailed information on pest identification, prevention, and control methods, emphasizing integrated pest management strategies. Timely updates on emerging pest threats are crucial.

Strengthen awareness and education on pest and disease management:

- Extension services must intensify efforts to create awareness about common tomato pests and diseases. This can be achieved through agricultural or extension agents, physical exhibitions, and the increased use of radio channels.
- Ensure that this information is readily accessible not only to farmers but also to agro-dealers, as they often play a key role in suggesting pesticide choices.

Leverage communication channels for information dissemination:

Radio broadcasts have proven effective in reaching farming communities in the study's LGAs. These channels should be consistently utilized to provide information on high-quality seeds, Good Agricultural Practices (GAP), and variety availability.

- Use informative posters placed strategically in agro-dealer shops to complement radio broadcasts.
- Translate educational materials into local languages to ensure all farmers can access and understand the content.

Employ more field Officers from the community:

- Hiring field officers from the local community can provide timely support and guidance to farmers. These officers can offer essential resources, facilitate training sessions, and build trust within the farming community. Additionally, a network of community-based officers can improve the availability of high-quality seed by assisting farmers in finding the seeds they need.

Offer bundle options to ease financial burden:

- Consider offering bundle options that include seeds, fertilizers, and pesticides as a package deal. This can make it more convenient for farmers to access the necessary resources for successful tomato cultivation.
- Bundling these resources, potentially even as a loan package, can help reduce the financial strain on farmers.

Establish a reward System for key farmers:

- Recognize and reward key farmers who have received training and actively share their knowledge with neighboring farmers. Incentives such as free high-quality seed and pesticides can motivate these farmers to serve as advocates for best practices within their communities.

Improve timely supervision and extension visits:

- Develop a well-structured schedule for extension visits and supervision that aligns with critical stages of cultivation.
- Organize regular farmer meetings and workshops before the farming season starts to disseminate information on good agricultural practices.
- Create a feedback mechanism that allows farmers to report issues and request extension support promptly.
- Ensure that extension officers respond promptly to farmers' requests and concerns, fostering trust and reliability.