Bridging the Gap between Pre-basic Seed Producers and Decentralized Multipliers for a Sustainable Sweetpotato Seed System in Tanzania



Fig 1. Mr. Emmanuel Mabesa describing his business to a journalist for marketing purposes. Kahunda village, Mwanza, Tanzania. (Credit K. Ogero)

- A study was conducted to understand the economic sustainability of basic seed enterprises to bridge the gap between pre-basic seed producers and decentralized vine multipliers.
- Four commercial seed multipliers were supported on a 2:3 (multiplier: CIP) cost-share basis. They were trained in entrepreneurial skills, marketing, business planning, and quality seed production.
- Business plans are now under implementation, and basic and pe-basic seed producers are now well-linked.
- The basic seed business required an initial investment of US\$ 6,241, for a multiplication period of 12 months. US\$ 1,314 is for the screenhouse to conserve quality seed.
- The payback period is one to two years, with an average annual return of 23-52%.



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What was the problem?

In many contexts, decentralized vine multiplication is considered appropriate to disseminate quality seed for sweetpotato because of perishability, bulkiness and transport costs. However, decentralized vine multipliers (DVMs) and producers of early generation seed are not well-linked. Bridging the gap between upstream pre-basic seed producers and DVMs producing Quality Declared Seed (QDS) will contribute towards the smooth flow of seed along the chain and enable farmers' sustained access to quality seed. This research sought to address this challenge by determining the financial feasibility of business models for medium-scale sweetpotato basic seed enterprises.

What objectives did we set?

The goal of this activity was to determine if mediumscale seed entrepreneurs would be commercially sustainable and act as an interface (the 'missing middle') between the "formal" and decentralized seed systems.

Where did we work?

This work was conducted in Geita and Sengerema districts in the Lake Zone, Tanzania. Linkages between the multipliers and the following seed stakeholders were established:

a) Tanzania Agricultural Research Institute (TARI), Ukiriguru, as the source of pre-basic seed

- b) Local government extension departments for technical backstopping and links to root producers
- c) NGOs promoting orange-fleshed sweetpotato as an important linkage for downstream market

What did we achieve during SASHA Phase 2?

Strategy:

- **Cost-sharing:** To ensure continuity after project close-out, a cost-share approach was adopted to meet the costs of screenhouse construction and installation of irrigation equipment. The project contributed 60% of the initial investment and the multipliers contributed 40%. The multipliers have since continued vine multiplication on their own with only technical backstopping from CIP.
- Production strategy: Four male multipliers were linked with Tanzania Agriculture Research Institute (TARI)-Ukiriguru, which is the source of pre-basic seed. After purchase of pre-basic seed, they planted it in medium sized (49.5 sqm) screenhouses from where they harvested and multiplied further in isolated open fields. Open field multiplication is either done through rapid multiplication or conventional multiplication. In rapid multiplication, close spacing (20 cm x 10 cm) is used leading to high quantities of vines. On the other hand, conventional multiplication uses a spacing of 1 m x 0.3 m and targets both root and vine production. Multipliers choose a combination of both depending on the market situation.

- Capacity building: The multipliers were trained on good agronomic practices and business skills. In addition, they were assisted to develop business plans for their seed businesses for proper planning and marketing. Training on agronomic practices ensured that the multipliers can meet the seed quality standards stipulated by the Tanzania Official Seed Certification Institute (TOSCI). The multipliers now have a better grasp of quality assurance, can manage pests and diseases and maintain varietal purity.
- Marketing and promotion: The main market segments include institutions such as NGOs, prisons and research centers; individual farmers and health centers. Strategies used in marketing include use of signboards, mass media, one-on-one promotion, posters and national agricultural fairs among others. One-on-one promotion among neighbors and friends has led to an increase in purchases among smallholder farmers. The multipliers learnt how to package their products. Planting material is now often sold in well-labeled bundles. They sold 293,950 cuttings worth US\$ 2,672 from 2016 to 2018.

Case study: Fostering competition and collaboration to enhance sweetpotato seed business

Production and sale of quality planting material has been increasing steadily. Two of the multipliers explain how competition and collaboration can contribute to better enterprises. Based in Geita district, Mr. Mpina Mikidadi and Mr. Masatu Matale are about seven kilometers apart therefore competing for the same market. Despite this they have embraced a unique working relationship whereby they refer customers to each other when facing a deficit. This has enabled them to become the best performing multipliers in terms of production and sales. They share their stories below:



Fig 2. Mpina Mikidadi and Fatuma Selemani at their multiplication plots in Chigunga village. Geita district, Tanzania. (Credit: K. Ogero)

Mikidadi Mpina

I am the village extension officer for Chigunga village (Fig. 2). In addition, I do sweetpotato seed production in liaison with my wife, Fatuma Selemani. We started seed multiplication in 2010 during Marando Bora project as a large group. However, the group split, and we continued alone. We have been involved in SASHA 2 project since 2016. When we started, we had three orange-fleshed varieties (Kabode, Ejumula and Mataya) and two white-fleshed varieties (Polista and Mazao). Mataya and Mazao were later dropped due to susceptibility to drought and viruses respectively. NASPOT 13 (orange-fleshed) and Umeme (white-fleshed) were adopted as replacements. We multiply both orange-fleshed and white-fleshed varieties because our community is not used to the orange-fleshed varieties due to the low dry matter content. Farmers from within prefer white-fleshed varieties. However, they are not willing to pay for the seed. Under SASHA 1 (Marando Bora), we sold a lot of vines through a voucher system. Sales under SASHA 2 have been low. For example, since 2016 our neighbors only bought seed worth TZS. 79,000 while institutions bought seed worth TZS. 2,000,000.

I have a screen house where I maintain my stock of clean seed. We harvest from the screenhouse and multiply in the open field before selling. However, open field multiplication is risky since people steal your vines and vines are exposed to pests and diseases. My cost of production for the last two seasons was TZS. 589, 500 and I generated TZS. 2,079,000. In addition, I sold 14 bags of roots worth TZS. 539,000. I work closely with Mr. Masatu Matale despite our conflicting business interests. He buys basic seed from me and sometimes I refer customers to him. For example, my seed production in 2018 was low because my daughter was sick. I could not satisfy my customers' demands and had to refer them to Masatu.

Successes

- Gained knowledge in pest and disease management
- Expanded our multiplication field
- The screen house has enabled us to maintain a clean stock of planting material for a long time
- Health benefits through consumption of nutritious orange-fleshed sweetpotato
- Increased household income

Challenges

• Seed theft by neighboring farmers

- Some varieties e.g. Ejumula get re-infected quickly once planted in the open field
- Weevil infestation especially during the dry period
- Prolonged dry periods
- Limited markets
- Lack of root processing facilities

Future

- Continued awareness creation on the benefits of quality seed and orange-fleshed sweetpotato
- Educate the community on the need to pay for quality vines

Masatu Matale

I started production of clean sweetpotato seed in 2010 under Marando Bora project (Fig. 3). At that time, I was part of a group. Other members left when the project ended but they had gained knowledge on production of clean seed for sweetpotato. I continued to multiply as an individual and have benefited a lot. Income generated from sale of vines was used to pay school fees for my kids and cater for household needs. I continued to multiply Kabode, Ejumula, Umeme and Jewel varieties after Marando Bora project. The current project facilitated me with a screen house, but it was vandalized. However, I continued to multiply in the open field while sourcing starting material from Mpina Mikidadi. In 2016, I generated TZS. 750,000, TZS. 800,000 in 2017 and TZS. 550,000 between January and November 2018. My cost of production during the whole period was TZS. 412,000.

Challenges:

- Seed theft
- Low willingness to pay for vines among smallholder farmers
- Limited markets
- Prolonged dry periods

Lessons learned

Aligning production with market demand: Seed

multipliers can produce high quality seed but need to plan their production, aligning their multiplication calendar with market demand; and increase their economies of scale at the open multiplication stage to ensure that they sell at a competitive price. To support this an ideal multiplication calendar has been established indicating the number of cuttings expected at each stage (Fig. 4). The best time to expand production is during the dry period. This ensures that planting material ready for sale at the onset of rains. However, this requires investment in irrigation.

Financial feasibility of basic seed production: Table 1 shows the income statement for the basic seed multiplication business. An initial investment of US\$ 6,241 is required of which US\$ 1,314 is for the screenhouse. The balance of US\$ 4,927 is estimated to be total cost of production during complete crop cycle period of 12 months. Fifty per cent of total costs were due to labor costs during crop cycle period. The second highest cost share is for fertilizer and fuel for irrigation which is about 18%. It is important to find innovative ways of reducing labor costs for business sustainability.

Further analysis as part of the financial feasibility study concluded that the Net Present Value (NPV) is positive and investment US\$ 6,241 in the basic seed business is financially viable in the long-run provided seed multipliers align their production calendar to the market situation and seasons. Further, the results showed and Internal Rate of Return (IRR) of 93% (discount rate 18%). Sensitivity analysis shows that the investment is stable even if there are price shocks. The payback period would be between one to two years, with an average annual return of between 23-52%.

Strengthening marketing and promotion along the value-chain: Use of SMS platforms and WhatsApp on phones



Fig 3. Masatu Matale inspecting the quality of his sweetpotato vines. Geita district, Tanzania. (Credit K. Ogero)

Future

- Expand my multiplication plot from the current two acres
- Registration with the Tanzania Official Seed Certification
 Institute (TOSCI)
- Increase efforts in marketing
- Create awareness through radio Storm, Geita



Fig 4. Ideal multiplication calendar. The dark-green rectangles indicate screen house multiplication. The solid blue, pink and green triangles represent first open field multiplication plots whereas the broken colors represent the second round of open field multiplication for the same plots. Brown ovals represent number of three-node cuttings harvested; whereas the red roots represent the number of five-node cuttings harvested and going for root production.

can particularly play a huge role in marketing. In addition, local radio plays an effective role in marketing especially for smallholder farmers. Most radio stations have agricultural programs that are topic-based. Multipliers can liaise with their local governments to secure airtime. ICT platforms have the potential to support seed tracking and marketing.

What's next?

The multipliers are committed to continued implementation of their business plans and are keen on forming an association to aid them in marketing. We would like to: Table 1: Income Statement for Basic Multipliers (P&L Account) (one production cycle 12 months-2 seasons) using screenhouse and open field rapid multiplication in Tanzania

Indicators		Value (US\$)
Total cost for establishing mini-screenhouse (Fixed costs)		1,314
Number of cuttings to be sold to root producers		1,680,000
Price per cutting		0.007
Sales (Gross Revenue)		\$12,174
Cost of Sales (variable costs)		
Planting material		\$26
NPK fertilizer		\$487
Manure		\$146
Petrol/Diesel		\$414
Total labor costs		\$2,486
Total Cost of Sales (variable costs)		\$3,559
Gross Profit (Gross revenue minus total cost of sales)		\$8,615
Less Other Expenses (Including fixed costs depreciated)		
Selling and distribution expenses (marketing costs)	500	
Overhead	\$534	
Operational expenses (i.e., rent, taxes, etc.)		
Depreciation	\$263	
Provision for doubtful debts	\$36	
Bad debts written off		
Other miscellaneous expenses	\$36	\$1,368
Total Costs of production (variable costs + other expenses)		\$4,927
Net Profit (Gross revenue minus total cost of production)		\$7,247
Gross Profit Margin (%)		70.8
Net Profit Margin (%)		59.5
Total investment including one year running cost		\$6,241

Source: Key informant interviews with farmers and experts and authors' calculation. Please refer to authors for detailed list of assumptions.

- Enhance marketing and promotion to increase adoption of quality seed of improved varieties, such as NASPOT 13 which is orange-fleshed and with high dry matter. This will increase uptake of nutritious varieties among smallholder farmers.
- Improve distribution mechanisms through strengthening contract arrangements especially with NGOs; and identify profitable root markets to enhance uptake of quality planting material.
- Liaise with regulatory bodies for quality assurance, and enhance post sales services for customers to ensure quality is maintained.
- Enhance supply chains for insect proof net and access

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to credit facilities to increase purchasing power for key inputs for seed production.

 Establish gender responsive co-investment packages for commercial seed producers, including a joint enterprise approaches to address cultural norms around women's involvement in business.

Partners • Tanzania Agricultural Research Institute (TARI) • Geita and Buchosa district councils

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