



Improving access to quality seeds in Africa

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To promote better access to high quality African indigenous vegetable seeds among African smallholders, CABI has tested three farmer-led seed production models in Kenya and Tanzania (contract model, research model and quality declared seed model), and helped relevant stakeholders develop the necessary skills to establish and manage seed production and marketing enterprises.

Summary

AIVs (African indigenous vegetables) have traditionally been a significant contributor to food security and nutrition for smallholder farmers in East Africa and are also important in providing incomes, particularly for women. However, farmers' capacity to meet a growing demand for these vegetables has been limited by lack of good quality seed.

After testing three farmer-led seed production models, the project team – facilitated by the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) and led by CABI – concluded that a 'contract' model is the most effective, with farmers earning on average US\$4,500 (up from US\$1,500) per year. Under this system, farmers are linked with the private sector and are guaranteed to receive high quality seed that meets regulations and market requirements, while also being assured of a market. For farmers with no formal contracts with seed companies, a 'research mediated' model was found to be the most appropriate in countries with a strict regulatory seed system, and where regulations are more flexible, a 'quality declared seed' model worked well.

Plans are underway to upscale this work in Burundi, Kenya, Rwanda and Uganda and begin tackling marketing challenges, to provide and sustain the demand for high quality AIV seed.

Findings

Under the contract model, the quantity and quality of seed produced by farmers participating in the project increased significantly: Amaranthus increased from 2,134kg to 5,918kg; African nightshade

from 3,832kg to 27,997kg; Jute mallow from 1,770kg to 17,706kg; and Crotalaria from 6,669kg to 24,253kg. Adoption of proper management practices reduced the proportion of seeds rejected by the Kenya Plant Health Inspectorate Service (KEPHIS) from approximately 40% to less than 5%, with the seed achieving purity rates of between 99-100% and germination of 79-88%. As a result, farmers earned an average of US\$4,500 per year.

Farmers in Dodoma, Tanzania, produced and marketed quality declared seeds (QDS) of African eggplant, grain Amaranthus and African nightshade, with purity and germination rates ranging between 92.3-99.0%, and earned a total gross income of US\$10,470, with US\$3,647 being income from seed produced by women.

European funding

This work was financed through a Multi Donor Trust Fund (MDTF) to ASARECA. The European Union, the UK's Department for International Development (DFID) and the Canadian International Development Agency (CIDA) contributed funds.

Project milestones

- Feb-April 2010: Project sites for each seed production model identified, baseline study conducted to determine training needs of farmers, and training curriculum developed.
- Aug-Dec 2010: Training of Trainers (ToT) workshops conducted in Kenya and Tanzania. ToT graduates conduct on-farm training of participating farmers.

Research mediated model:

- Jan-March 2011: Lagrotech Seed Company multiplies foundation seed. Descriptors for vegetable Amaranthus and Spiderplant developed.
- July-Dec 2011: Seeds harvested and processed, KEPHIS test purity and germination, Memorandum of Understanding (MoU) signed between the Kenya Agricultural Research Institute (KARI) and Lagrotech.
- Jan-May 2012: KEPHIS issues seed test certificate, allocates lot numbers and authorises distribution of seeds. Selected farmers registered as seed growers and start producing seed.

Contract seed production model:

- Jan-March 2011: Assessment of yield after harvesting and processing of AIV seeds and delivery of seed to Simlaw Seed Company Ltd. for further processing.
- April-Aug 2011: KEPHIS tests purity and germination, issues seed test certificates, allocates lot numbers and authorises marketing by Simlaw Seed Company.

Quality declared seed model:

- Sept-Dec 2010: Tanzania Official Seed Certification Institute (TOSCI) inspects seed crops.
- Jan-March 2011: Assessment of yield after harvesting and processing of AIV seeds.
- April-June 2011: TOSCI tests seed quality, issues seed testing certificates, allocates lot numbers and authorises marketing by farmer groups.

Costs and benefits

Research mediated model:

- Production cost of starter seed was US\$185 per ha (including US\$78 for certification).
- With an average yield of 70kg per ha and a sale price of US\$1.8 per 25g of seed, Amaranthus could generate a gross income of US\$3,145 per ha in one cropping season.

Contract seed production model:

- Contract farmers spend approximately US\$140 per ha to meet production costs.
- Total seed produced during the 2010/11 cropping season was 5,918kg of Amaranthus (sufficient to plant 1,500 ha), 27,997kg of African nightshade (18,000 ha), 17,706kg of Jute mallow (3,000 ha)

and 24,253kg of Crotalaria (5,000 ha), translating to a total gross income of US\$519,309, with farmers earning on average US\$4,500 each.

Quality declared seed model:

- ODS farmers spend approximately US\$50 per ha.
- Total seed produced was 73.8kg of African eggplant, 2,597kg of grain Amaranthus and 10.8kg of African nightshade. This translated to a total gross income of US\$10,470, with farmers earning on average US\$300. The seed produced would allow cultivation of 150 ha of African eggplant, 2,100 ha of grain Amaranthus and 17 ha of African nightshade.

Impact

African indigenous vegetables (AIV) have traditionally been a significant contributor to food security and nutrition for smallholder farmers in East Africa and are also important in providing incomes, particularly for women who sell vegetables at local markets to supplement their income. However, the potential to meet a growing demand for these vegetables has been limited by lack of good quality seed. In Africa, less than ten per cent of the seed planted is purchased from the formal market. The Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) facilitated a partnership of organisations, led by CABI, to work on a project to scale up farmer-led AIV seed enterprises in Kenya and Tanzania, testing three seed production models.

In Kenya, where seed production regulations are very strict, farmers have to be registered and meet Kenya Plant Health Inspectorate Services (KEPHIS) requirements for seed certification. Under the 'contract' model, farmers enter into a contract with a seed company, which provides the foundation seed and agrees to purchase all clean seed at an agreed price that meets standards on purity, moisture content and germination rate, while the farmer agrees to sell all of their seed to the company. The company also funds crop inspections and registering of the seed growers.



In 2010, 294 farmers (including 83 women) in Bungoma, western Kenya were linked to the Kenya Seed Company Ltd., through its subsidiary, Simlaw Seed Company. The farmers, plus nine stockists and marketing agents, and 13 field assistants were trained in regulatory requirements for seed production, post-harvest handling, processing, packaging and marketing. Once registered, the farmers were supplied with vegetable Amaranthus, African nightshade, Jute mallow and Croalaria seed – four species that had been prioritised by farmers in the area.

Significant increases in the quantity of seed produced following training were recorded. Vegetable Amaranthus increased from 2,134kg in 2009 to 5,918kg in 2010; African nightshade from 3,832kg to 27,997kg; Jute mallow from 1,770kg to 17,706kg; and Crotalaria from 6,669kg to 24,253kg. Adoption of improved management practices reduced the proportion of seeds rejected by KEPHIS from approximately 40 per cent in 2009 to less than five per cent in 2010, with the seed achieving purity rates of between 99-100 per cent and germination of 79-38 per cent. Prior to the project, purity and germination rates rarely exceeded 70 and 50 per cent respectively.

The higher yields have translated to higher incomes for farmers, earning an average of US\$4,500 per year, up from an average of US\$1,500. The success of the contract model has also drawn interest from other farmers in neighbouring districts, who are seeking training and contracts from Simlaw Seeds Company.

Under the 'research mediated' model, also tested in Kenya, farmer groups work with an agricultural research institute – in this case the Kenya Agricultural Research Institute (KARI) – which provides foundation seed and seed merchant certification. KARI advised and monitored four farmer groups (120

farmers, including 73 women), who were trained by ten project-trained extension workers from a local Community Based Organisation — the Technology Adoption Through Research Organisation (TATRO).

By 2010, the selected farmers were ready to initiate their seed enterprise, but KARI did not have any foundation AIV seed that met KEPHIS requirements for seed certification. After sourcing 5g of breeder seed of Spider plant and 5g of Amaranth from AVRDC-The World Vegetable Centre, Lagrotech Seed Company, in close collaboration with KEPHIS, developed descriptors to ascertain the characteristics of the varieties and produced 5.4kg of Spider plant foundation seed and 10kg of Amaranth foundation seed. The development of descriptors is a key milestone towards ensuring that the new varieties go through an official release process in Kenya, enabling them to be marketed both nationally and internationally. The experience gained in the development of descriptors can also be used in developing descriptors for other lines of priority AIVs.

Having successfully met the minimum quality standards for germination and purity tests, the seeds were packed in 25g packets and distributed to the four farmer groups in May 2012. Despite training 120 farmers, only 34, including 17 women, were able to plant 1.7 hectares of Amaranthus and 2.2 hectares of Spider plant seed in May 2012; the majority had already planted other food crops. Although the seed has yet to be harvested, TATRO's extension workers are linked to a network of 1,200 farmers engaged in the production of AIVs who will be able to use the quality seeds.



In Dodoma, Tanzania, irrigated AIV production is undertaken along the major rivers. Most farmers, however, use saved seed, resulting in a low demand for certified seed and little investment by private seed companies. The 'quality declared seed' (ODS) model therefore offered Tanzanian smallholder farmers an opportunity to produce quality seeds. Under the ODS model, farmers are registered to produce seed, following regulations and guidelines set out by a national certification agency. Harvested seed is tested by the agency, and can be sold within a specific geographical location if it meets certain standards.

African eggplant, grain Amaranthus and African nightshade were produced by five groups of smallholder farmers from villages in Kongwa and Mpwapwa districts. Officials from the Tanzania Official Seed Certification Institute (TOSCI), together with agricultural extension staff, helped farmers to select suitable sites for producing seeds. Through a training of trainers course in 2010, four extension officers (including two women) and four lead farmers were trained by CABI and partner organisations. These trainers conducted season-long training of 47 farmers (22 women), during the 2010/2011 cropping season. Each farmer subsequently trained five more farmers during the 2011/2012 season.

In 2011, seed testing revealed purity and germination rates ranging from 92.3-99 per cent. Total seed produced in the 2010/2011 cropping season by 38 farmers, including 16 women, was 73.8kg of African eggplant seed, 2,597kg of grain Amaranthus seed and 10.8kg of African nightshade seed, resulting in a total gross income of US\$10,470, including US\$3,647 from seed produced by women.

By June 2012, participating farmers were planning to expand the area under seed production, placing an order for more foundation seed of the three crops for the next cropping season.

Reviewing the three models, the project team concludes that where seed regulations are strict, the contract model is the most effective. By linking with the private sector, farmers are guaranteed to receive high quality seed that meets regulations and market requirements, and are assured of a market. With a network of stockists to distribute the seeds, nationally and internationally, private companies are able to reach a large number of farmers.



While the research mediated model provides a great opportunity for farmers with no formal contracts with seed companies to engage in seed business, under a strict regulatory seed system, continuous support through capacity building of seed growers particularly in seed production and marketing is necessary. This will ensure that such enterprises become more efficient and profitable, and gradually transform into independent entities.

In countries where large seed companies do not exist, and where regulations are flexible, the ODS model has been found to work well. However, sustainability of the model depends on constant production and

marketing of the vegetables, which can in turn provide and sustain the demand pool for the seeds, and effective linkage with a source of foundation seeds.

CABI and KARI already have plans to upscale this work in Burundi, Kenya, Rwanda and Uganda, where assessments will be carried out to determine which of the three models will be most relevant in each area. However, sustainability of seed enterprises require a holistic value chain approach. This includes ensuring smooth production and marketing of the vegetables, which can in turn provide and sustain the demand pool for the seed section of the value chain. As a first step towards this, KARI has already linked up with the Kenya Agricultural Productivity and Agribusiness Project (KAPAP), which is promoting production of AVs as an agribusiness. ASARECA has also provided additional funds to tackle marketing challenges, and this work will begin in 2013.

What others say about the report

Dr Daniel Karanja, CABI

“Close collaboration with partners, including government ministries, private companies, NGOs, national regulation bodies, researchers and community based organisations, provided a broad base of skills and expertise that made things work very well.”

Tosio Ekakoro, farmer, Teso District, Kenya

“I personally have benefited from Kenya Seed Company. From income from nightshade seed I planted in 2010, I have bought a motor cycle. Right now my child attends school, without fail.”

Timotheo Kusenha, farmer, Dodoma, Tanzania

“I stopped growing African eggplant as a vegetable after realising that selling seed was more profitable.”

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Acknowledgements

CABI is an international intergovernmental organisation, and we gratefully acknowledge the core financial support from our member countries (and lead agencies) including the United Kingdom (Department for International Development), China (Chinese Ministry of Agriculture), Australia (Australian Centre for International Agricultural Research), Canada (Agriculture and Agri-Food Canada), Netherlands (Directorate-General for International Cooperation), and Switzerland (Swiss Agency for Development and Cooperation).

Project donors

Association for strengthening Agricultural Research in Eastern and Central (ASARECA)

Project partners

European Initiative on Agriculture Research (EIARD)

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How to cite this paper

Kimenye, L. 2014. Improving access to quality seeds in Africa. CABI Study Brief 7.
DOI: <http://dx.doi.org/10.1079/CABICOMM-64-57>