

Community seed banks as seed producers

Cases from India, Nepal, Uganda and Zimbabwe

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Front cover image: Seed stock of the the Agyauli community seed enterprise, Nepal.
Credit: P. Shrestha

Abstract

Community-based seed producers are a relatively under-researched and under-documented category of seed producers, but have the potential to cater to the diverse seed needs and interests of smallholder farmers. This working paper presents a number of such community-seed producers, with a focus on community seed banks. The case studies from India, Nepal, Uganda and Zimbabwe point to the viability of community seed banks as seed producers and distributors, but becoming successful is not easy and depends on several factors, including initial technical guidance and support, sufficient time, adherence to a seed value chain perspective and the development of a sound business plan from the very start.

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We thank our partners in India, Nepal, Uganda and Zimbabwe for their contributions to the study and this report, in particular through the facilitation of visits to a number of community seed banks and interactions with the members. As far as we know this is the first study about community seed banks as seed producers and distributors. We hope to carry out more case studies in the coming time to enrich the study and this report.

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1. Introduction

Ronnie Vernooy, Alliance of Bioversity International and CIAT

In many countries around the world, farmers obtain seeds from a diversity of seed production sources – these can be based locally, regionally, nationally or internationally. In any given year, a farming household might use their own saved seed for crops such as bean, finger millet, (traditional) maize varieties, rice and sorghum. The household may buy groundnut seed at the local market; and seed of exotic vegetables from national or international commercial companies. In some countries, it may obtain seed of improved or hybrid maize from national public research institutions through government extension services or international aid distribution programmes. The following year, the household might decide to change the mix of crops and their seed sources (Subedi and Vernooy 2019).

Mechanisms to obtain seeds (and planting materials) vary and include monetary and non-monetary transactions (e.g. seeds exchanged for “future” seeds, seeds exchanged for labour, seeds to be paid with a fixed percentage of the harvest). Very often seed transactions are embedded in the fabric of socioeconomic relationships in the community and beyond. Thus, seeds are not only planting material (i.e. physical capital), but social capital as well. For example, farmers use seeds as gifts to establish (new) or solidify (existing) social relations. Women farmers play key roles in farmer seed systems, although they are often overlooked by researchers and development personnel, policies and programmes. Social actors engaged in producing and distributing seed in most countries around the world include:

- individual farming seed saving households
- farmer seed networks
- community-based seed producers (e.g. a community seedbank with a seed production arm)
- local traders
- local seed enterprises (business) catering to local markets in low volumes
- government seed operations or programmes
- national private seed companies
- regional and multinational private seed companies.

Many factors influence the operations of seed producers and distributors, whether or not these operations are integrated in one enterprise or organization. They include history, objectives, types of crops and crop varieties, types and levels of investment (science and technology, capital, human resources), scale, size, type and density of seed networks, whether or not intellectual property rights are used and if so what type, and the policy and legal context. Policies and laws regulate who can produce and sell which kind of seed, how quality assurance is organized, and how rewards and support are allocated. Regulatory frameworks vary between countries, though efforts are underway to make them more harmonized. They usually have a significant influence on how the seed sector has evolved, how power and influence are distributed and in what direction the sector will go (Subedi and Vernooy 2019). Besides socioeconomic and political factors, environmental factors are also important, including climate change.

Community-seed producers are a relatively under-researched and under-documented category, but have the potential to cater to the seed needs and interests of smallholder farmers. This working paper presents a number of such community-seed producers, with a focus on community seedbanks. Community seedbanks first emerged with a focus on conservation of crop diversity, but in recent years, some of them have developed additional and complementary activities, such as crop improvement and seed production and distribution (Vernooy et al. 2015, Joshi et al. 2019). Emerging experiences suggest that community seedbanks can deal with some of the major bottlenecks that seed systems are facing. In this working paper, the focus is on community seed banks that maintain a conservation function, but it is recognized that the concept of community seed bank is also used

for community organizations whose only function is to produce seed, such as the model developed by ICRISAT in Malawi (Box 1).

Box 1. The ICRISAT-CSB model in Malawi

Private sector seed companies have little interest in open pollinated crops such as groundnut, which is hampering smallholder access to improved varieties. ICRISAT developed, piloted and then scaled out an informal system that depends on farming community cohesion to deliver improved seed technologies, called the Community Seed Bank (CSB). A CSB is village-based institution managed by smallholder farmers to produce and distribute quality declared seed in the community. It is an informal and open genetic system, in which smaller populations inhabiting agro-ecological niches are connected by migration and colonization of farmer-saved seed. The CSB operates on commercial banking principles of lender and borrower, by which the borrower takes a loan (seed) and pays it with interest (an agreed extra volume on top of the seed loan). ICRISAT, apart from promoting the model, also supported farmers through collaboration with the public and farmer organizations extension staff to disseminate improved agronomic practices. This approach ensures good seed access and availability at the right time and right price. This CSB model with some modifications can now be found in Malawi, Mozambique, Tanzania and Zambia, to ensure timely availing of quality seeds to remote areas with poor road infrastructure; and support rapid dissemination of improved varieties in communities. In Malawi, ICRISAT reached 40,000 farmers in a short time, expanding the groundnut production area significantly while also increasing productivity to one ton/ha. The trained members of the CSBs are also now supporting a slowly growing legume seed industry.

Source: GLDC 2020. Nomination Form: CGIAR's 50 Greatest Innovations. Community Seed Bank, a seed delivery model for under invested crops. GLDC, Hyderabad.

Seed system bottlenecks

Almost everywhere, local seed practices are under stress. Urbanization, agricultural intensification and commoditization and privatization of natural resources are contributing to a decline in collective local seed management. Farmers are substituting local varieties with hybrids that can be easily purchased from agro-dealer shops or at local markets. Traditional seed exchange relationships have become weaker in many areas. In some countries, they are becoming criminalized due to new revised seed policies or laws. Recent studies reveal that the legal operating space for farmers and communities to save, produce, exchange and sell seed is being reduced and related farmer practices of sharing and distributing seed, criminalized. Only in a few countries, such as Bolivia, Ethiopia, Nepal and Uganda, are farmer-centred seed production and exchange practices obtaining increased recognition and support.

One major challenge farmers face in producing and obtaining seed is poor quality. Quality control of farmer-saved seed is largely based on trust embedded in social relationships, while quality control of seed produced by the other social actors is often subject to external written rules and regulations. How much actual quality control takes place is, however, a moot point. In many rural communities, poor storage practices and facilities affect seed quality. Farmers everywhere complain about the sale of 'fake' seeds, for instance grain sold as seed or non-certified, low quality seed sold as 'improved' seed. Fake seeds have direct negative impacts on crop productivity and farmer income.

Another major challenge is that in many countries it is very difficult to obtain new varieties of interest to farmers due to poorly developed or badly supported delivery systems. Farmers often do not know about which other crops or crop varieties they could grow on their farm and have no or poor access to new and improved crop diversity.

This obstacle seriously hinders farmers' efforts to adapt to climate change. Climate change has begun to put additional pressure on farmers' seed and food production systems and on the multiple functions that they fulfil. Future impacts of climate change are expected to become more pronounced in many parts of the world, forcing farmers to change their practices and causing them to search for information about crops and varieties better adapted to new weather dynamics. Access to quality seeds will become even more important (Vernooy et al. 2017).

Women farmers are often interested in different portfolios of crops and crop varieties, for example, requiring less regular labour inputs, easier to transport, with a longer shelf life and with a high nutrient density. Resilient seed systems should be gender-responsive and support women's agency, and their ability to make decisions about how to successfully manage their farms and gain access to the resources they need including seeds.

Covid-19

Unexpected, major events, such as the Covid-19 pandemic, are likely to put additional stress on farmers' seed systems, affecting timely, affordable and easy access and supply of seed of preferred varieties in the short and medium terms. In the spring of 2020, a team led by The Alliance of Bioversity International and CIAT developed a seed survey to assess the impact of Covid-19 on access and supply of seed in selected countries of Africa, Asia and Latin America, oriented to farmers, community seed bank managers and farmer seed entrepreneurs. Preliminary results from Kenya, Tanzania and Uganda, indicate that many farmers in the three country experience hikes in costs of seed and other inputs, including labour, and an increase of food prices. They reported that seed is harder to obtain, contract farm workers and sell produce. Many farmers have adjusted their cropping portfolio for the 2020 season. The results will be further analyzed and presented in more detail in the next technical report. In Kenya, the Seed Savers Network-Kenya hosted an on-line dialogue with African farmers and Civil Society Organizations which, aired through Radio Amani, a Kenyan radio station, about COVID-19 and farmer markets and stores. 23 participants from Kenya, Tanzania, Uganda, Zambia and Zimbabwe attended. The dialogue made clear that based on differences in farming systems, some farmers are coping better than others, based on the degree of dependence or independence of the production unit on external supplies.

Results of a number of country seed sector assessments done by the Wageningen Center for Development Innovation of Wageningen University and Research (WCDI 2020), during 2020, provide additional insights in the impact of Covid-19. To varying degrees, countries experienced the following:

Seed production

- Mobility restrictions and social-distancing measures hamper access to labour and agricultural inputs for seed production
- Fear of virus transmission among farm, company and transportation workers, hinders seed production operations
- Mobility restrictions limit processing and transportation of seed from seed producers and companies to agro-dealers/points of sale

Seed market development

- Mobility restrictions and social-distancing measures hamper access to markets for seed companies, agro-dealers and farmers
- Reduced availability and increased seed prices result in substandard seed making its way to markets
- Fear of virus transmission among transportation workers, retailers and farmers, hampers the functioning of seed markets
- Mobility restrictions and social-distancing measures hinder the organization of variety demonstrations and field days

Seed sector service provision

- Mobility restrictions limit field inspection services for quality seed assurance
- Mobility restrictions, social-distancing measures, and workers' response hamper the production and supply of early generation seed (EGS)
- Mobility restrictions and social-distancing measures hamper the organization of meetings critical for variety release and registration
- Mobility restrictions limit farmers' access to finance for agro-input purchases
- Mobility restrictions hinder breeders from accessing new germplasm and conducting on-station and farm-based trials
- Mobility restrictions hamper the procedures required for seed imports

Revenue generation and reinvestment in the seed sector

- Constraints in the production, transportation and marketing of seed increase its price
- Economic consequences (farm and off-farm income) of the crisis reduce farmers' access to cash and thus the willingness to purchase quality seed
- In view of national food security, and the impact of measures on farmers and the agricultural sector in general, governments consider palliative interventions with major implications on the functioning of the seed market and industry
- Seed dealers disrupt markets by stockpiling seed and creating shortages to increase its price

Seed sector regulation and management

- Government and other stakeholders crucial to seed sector regulation are hampered in convening, decision-making and ensuring the implementation of regulations relevant to seed quality assurance, variety release and seed imports

An important question is if and in what ways community seed banks are able to deal with these bottlenecks by relying on the collective resources of their members. We may not know the answers in the short run, but the intent is to delve into these questions in the period ahead.

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2. Community seed banks as seed producers

Ronnie Vernooy, Alliance of Bioversity International and CIAT

The focus of this study is on farmer-produced seed, given that a large part of the seed that is produced and distributed by the commercial system is too expensive or not easily accessible and often not suited to the particular local environment of most farmers. Farmer-managed seed systems have the advantage of being responsive to local needs and preferences while contributing to maintaining crop diversity on the farm and in local communities. This is an important contribution to seed and food security. The importance of farmer-managed seed systems is evident from field data. For example, estimates for West Africa indicate that farmers access 90%–98% of their seed needs from farmer seed systems, and for the rest of Africa, it is 70%–95%. In Zimbabwe, despite the presence of many commercial seed companies, it is estimated that 80% of seed needs are satisfied by smallholder farmer seed systems. However, this does not mean that there are no challenges and bottlenecks. There are – such as technical seed-processing requirements, time and effort to develop entrepreneurial expertise, distribution and marketing constraints, and policy and legal restrictions (Mushita and Vernooy 2019).

Although originally mostly concerned about crop (and tree) conservation, community seed banks around the world have evolved by adding complementary activities, such as participatory crop improvement and seed production and marketing (Vernooy et al. 2015, Joshi et al. 2018). Seed production and marketing is not an easy endeavor, but one that appears to have good prospects. Unfortunately, few studies exist that zoom in on this activity. This study aims to fill this knowledge gap. Based on the global network of the Alliance of Bioversity International and CIAT, a few case studies were identified to be documented and included in this preliminary report. The intention is to add more case studies in 2020.

The case studies were based on a mixed methodology using literature review, focus group discussion, key informant interview and participatory observation (field visits). The questionnaire for the focus group discussion can be found in the Annex. The questionnaire follows the logic of the case studies of community seed banks developed by Vernooy et al. (2015), which focused on the origins, evolution and prospects of community seedbanks and addressed technical, organizational, financial and institutional aspects. These aspects are enriched by insights from selected literature on farmer seed production and distribution (see the list of references below). This report include case studies from India (three), Nepal (one), Uganda (two) and Zimbabwe (one).

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3. India: Emerging seed enterprise development

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Community Seed Bank: Mandla, Madhya Pradesh

Action for Social Advancement (ASA) is a non-profit development organization founded in 1996 by a group of development professionals with considerable collective experience of working with the tribal people in the Central part of India on participatory natural resources development. ASA has emerged as a prime and lead organisation in the sector of farm-based livelihoods for poor and marginalized communities faced with challenges of sustainable natural resource management. ASA currently works in nearly 1690 villages in 23 districts of Madhya Pradesh, Chhattisgarh, Bihar and Jharkhand, directly reaching out to about 179,000 families or nearly 950,000 people. ASA has always used a livelihood systems approach; a key factor of its success. The mission of ASA is ensuring livelihoods of poor people through providing developmental services, in particular through natural resources development. At the heart of the organisation is the aim of developing livelihood security, which is facilitated by an intensive participatory process of natural resources development and local institutional development. Particular emphasis is placed on involving/working with the poor and women. ASA is one of the partners in a UN Environment implemented GEF project in India, supported by the Alliance of Bioversity International and CIAT. It established its first community seed bank in 2013.

The major activities of the community seed bank are seed production and conservation, value addition of millets, rice and pulses, and input supply and marketing. Seed production of major varieties, such as Jeerasankar, MTU-1010, IR64, JR-81, JRB-1, JK-439, JK-41, JK-137, DPS-9, INDRA-1 JK-36, JK-38 was started in 2014. The active members linked to the CSB are a total of 3380 comprising men (1700) and women (1680) while 302 (men 42) and women (260) are involved in seed production. It is likely one of the largest community seed bank seed producers in the country.

Seed production and marketing

The availability and access to good quality seed was an issue in the farming communities primarily comprised of smallholder and marginal tribal farmers. ASA, while working in the project area, realized that to make significant changes in the economic aspects of the smallholder and marginal tribal farmers, there is a need to work on seed improvement, promotion of improved varieties and promotion of (regular/timely) seed replacement. With this in mind, the Farmer Producer Company (FPO), set up with the support of ASA and under the umbrella of the CBS, decided to undertake a seed production program. Currently, the FPO is involved in production of seeds of minor millets, rice, wheat and gram.

Every year a separate business plan is developed for the FPO. The business plan is fairly comprehensive and takes into consideration different components of inputs, seed production and commodity trading. The development of the business plan involves the Board of Directors, a few members of the FPO, staff of the FPO and key members of ASA (Image 1). Every year it is prepared in a workshop mode, which spreads over three days. Accordingly, key indicators are developed on half yearly, quarterly and finally on monthly basis to assess the progress. BoD members, apart from monitoring the business progress on a quarterly basis, also look at compliance. At critical junctures, bylaws are reviewed and necessary changes are made. For bookkeeping, a trained team looks into it on daily basis.

The shareholders of the FPO are women and they play major roles in seed production, based on a village meeting and selection of farmers for the seed production programme. As it is a technical programme, the whole family takes part. Both husband and wife participate in different capacity building events along with Village Resource Persons and other shareholders of FPO.

Quality control of the seed production programme is strictly done as per the seed production protocols. The ASA team in collaboration with state departments monitor the seed production plots through their inspectors and involving farmers. Farmers receive a Seed Certification Tag after harvesting, grading and clearance of seed samples. The FPO has their own registered brand, named “*Dharti Naturals*” for sale of FPO produce.

Business model and strategy

Every business pillar of the FPO has to be self-sustainable and should earn profit. Based on this principle, seed production, inputs purchase and trading are considered cost centers and, accordingly, the estimated costing is done by centers and certain profits are anticipated. This helps in financial planning and ensures a positive cash flow. As a long-term strategy, a five year rolling strategic plan is developed. Based on this plan, the yearly business plan is prepared. The community-based seed enterprise is member oriented and should benefit more than 80% of its members. With this basic criteria, the business strategy is defined. For ensuring sustainability, a portion of profit is kept separately for the marketing and promotion of the seed business. Usually, this is to the tune of 5-8% of total turnover.

In order to promote business the FPO has a common brand name “Dharti Natural” to promote quality seed and other outputs. This brand name is registered with ASA. Different FPOs use and contribute to it for promotion and communication. This brand has been common and well known among the FPOs and surrounding areas. The FPO buys back seeds from the farmers and brings these on the trade market with their brand. In addition to market sales, FPO also supplies seeds to the Department of Agriculture of the state to meet its seed requirement.

Determination of prices is a dynamic process and usually done through negotiations. However, prices are in line with market trends, price announcements made by the agriculture department and closeness to consumers. Usually, prices for institutional sales and retail sales differ significantly; but they are more or less in tune with the market price. The seeds are sold in areas where there is high demand. There are also institutional sales. Direct sales to the farmers are through FPO outlets. In recent times, some expansion has happened and new markets have been explored. The pricing by FPOs has been very competitive, mostly below the actual market price.

Seed source (s)

For improved varieties, breeder seeds are sourced from public agriculture institutions. The FPOs have experience in the production of foundation and certified seeds (Images 2 and 3). The FPOs have been able to maintain purity for different varieties and use them for seed production. The FPOs shareholding model includes smallholder and marginal farmers. They use their own land for seed production. FPO has 0.65 acre of land where they have constructed a warehouse and installed processing units for value addition of their produce. Farmers do the seed production by using their family labour as per technical guidance of ASA and state agriculture departments. Over the years, FPO has acquired all sorts of machineries for processing and value addition, like grader, de-stoner, de-husker and final processing equipment for value addition etc.

Feedback mechanism

This is an integral part of sales and service support. A database is maintained to identify product related issues and accordingly, necessary changes are made at product and service levels. However, the use of ICT tools is limited.

Challenges

Challenges occur with regard to quality production, marketing and financial viability. However, in-depth planning and a market-based approach have kept possible dangers/issues away from the FPOs.

Achievements

The FPOs have been able to increase their production by at least eight times to about several thousand quintals. Not a single seed is left for sale by the end of the season. All the members have greatly benefitted. They benefitted from quality seed, which improved their productivity. They paid less for seed compared to the market price and when the FPOs made profit, they shared with the members as patronage bonus. The FPO has established close connection with the members and supply of quality seed has ensured that the farmers buy seeds over and over again. Similarly, the FPOs as the custodians of breeder and foundation seeds, has ensured that seeds are conserved in a scientific manner complementing the appropriate propagation among member farmers.

Costs/benefits analysis

It has been a dynamic process given that FPOs are directly working in the market with a focus on providing quality seed at a competitive price. A tally and accounting system has been designed in such manner that all the costs are taken into consideration based on which the financial analysis is done. Over a period of time, the ratio has changed significantly as a result of changes in the programme.

Relief work under the COVID-19 Pandemic through Farmers' Producer Organization (an upgraded form of Community Seed Bank)

In 2020, a sudden lockdown was imposed by the government of India considering the significantly increasing cases of COVID-19. The lockdown in India has impacted the day to day life of everyone, but it has become evident that the poor are most the vulnerable. The daily wage labourers of the unorganized sector and farm labourers are the groups most severely affected. The social, economic, and psychological impact of the pandemic has most been felt by the majority population of India that belongs to the rural and migrant communities. Food production, supply and delivery have been badly impacted. In such a scenario, end-to-end measures to secure food supply is the only option available.

In the rural areas, agriculture input supply has suffered a huge setback due to which production is under threat. As a response, badly affected families were mobilized to the extent possible to enable themselves to get through the tough times. ASA took the lead to ensure that seed for the sowing of rainy season crops reached smallholder farmers. To support this activity, ASA "upgraded" its community seed banks to Farmers Producer Organization (FPO). ASA, through 25 FPOs, provided seeds of rice, maize, pigeon pea, minor millets, soybean and vegetables to support the poorest of the poor across working areas, those smallholder farmers who do not have any seed stock at their home and do not have the purchase capacity to buy seed. ASA volunteers distributed seeds of different crops among 57,539 farmer families through 25 Farmers' Producer Organizations.

Prospects for the future

This has been a successful case for the FPOs and it has been highly appreciated by the members and communities as a step towards quality seed supply and as a mechanism towards seed conservation along with establishing a profitable business. The FPOs are geared up to increase seed production and take it to adjacent blocks and districts, which are cultivating similar crops (Images 1-4).



Image 1: Member of Board of Directors of FPO. Image 2: Awareness raising and training of FPO members and farmers. Credit: Somnath Roy/ASA

धान, गेहूं, कोदो-कुटकी और चना की खरीदी- बिक्री की दी जानकारी

मंडला। खेत में किसानों की प्रशिक्षणों को पुरस्कृत किया गया। • नईदुनिया

मंडला। नईदुनिया प्रतिनिधि

कृषि विज्ञान केंद्र मंडला में माहिमति किसान उत्पादक कंपनी के कार्षिक साधारण सभा का आयोजन किया गया। पिछले वर्ष का किसान उत्पादक कंपनी का कार्षिक प्रगति एवं आय व्यय का ज्योरा दिया गया। किसानों की कंपनी में संघानित होने वाली गतिविधियां जिसमें बीज उत्पादन, संचालन, आधारीत रबी-खरीफ बीज उत्पादन धान, गेहूं, छोटी बुटकी, चना की खरीदी विक्रय का कार्य किस प्रकार से किया जाता है एवं उन्नत बीज तकनीकी मार्गदर्शन आता गवर्न संघी संस्थान एवं कृषि विज्ञान केंद्र के वैज्ञानिकों द्वारा किया गया। इस कार्यक्रम में भोपाल से आए प्रवीण शर्मा, कार्यक्रम समन्वयक, मुरार अली प्रोड्राम हायरकर, उपसंचालक किसान कल्याण एसएस मराठी, उपपरिचोजना संचालक आत्मा डॉ. रविशंकर सिंह, अरिष्ठ कृषि विकास अधिकारी आरआर रजक, कृषि विज्ञान केंद्र? मंडला के परिष्ठ वैज्ञानिक, प्रमुख डॉ. विनाल मेश्रम, डॉ. आरपी आंहरवार, डॉ. प्रणव भारती ने कृषि उपयोगी तकनीकी जानकारी प्रदान की। प्रतियोगिताओं का आयोजन -कार्यक्रम के दौरान विभिन्न प्रतियोगिताओं का आयोजन किया गया। जिसमें रस्सी खींच, कुर्सी दौड़, रंगोली प्रतियोगिता में कृषक दीदीयों ने बड़ बड़ कर भाग लिया। रंगोली प्रतियोगिता में कृषक दीदी ज्ञानवती सुकाम ने प्रथम स्थान, मीरा बाई ने द्वितीय एवं आरती बाई ने तृतीय स्थान प्राप्त किया। कुर्सी दौड़ प्रतियोगिता में कृषक दीदी ज्ञानवती सुकाम प्रथम स्थान, सुमंश बाई द्वितीय स्थान, रजनी परते ने तृतीय स्थान प्राप्त किया। इसी प्रकार रस्सी खींच प्रतियोगिता में आरजोती सुप विजेता हुए।



Image 4: Volunteers interacting with CSB members as part of routine interaction workshops. Credit: Somnath Roy/ASA

Image 3: Newspaper article about the training on sale and purchase of seeds along with local sports activities.

Community Seed Bank Barothi, Udaipur, Rajasthan

This community seed banks is managed by Seva Mandir, a non-profit organisation based in Udaipur, southern Rajasthan, India. The organisation was founded in 1968 by Dr. Mohan Singh Mehta, a distinguished Ambassador, administrator and education expert. Initially, Seva Mandir's work focused on adult education, with the aim of equipping the rural, predominantly tribal citizens of this area with the skills that would enable them to become active agents of their own development. In subsequent decades, this has expanded to include a wide range of activities: primary education,

health, early childhood care and development, sustainable management of natural resources, including agriculture and agrobiodiversity (conservation).

While working with the local communities it was realized that seed quality and availability was an important issue. This motivated Seva Mandir to start a discussion with the National Bureau of Plant Genetic Resources (NBPGR) about seed sources and supply. Based on these discussions it was decided to start working on a CSB with the funding support from NBPGR. A first community seed bank was established in 2007; and seed production started in 2008. Its primary activities are seed collection and distribution, seed conservation, seed processing, introduction of new varieties and capacity building. It deals with crops such as maize, rice, wheat, black gram, chickpea, mustard, little millet, sesame, groundnut, guar, okra and cucurbits. The active members involved in the CSB are 252 including men (174) and women (78) while 11 farmers (men 8 and women 3) have been designated as seed producers. The staff of Seva Mandir was trained by the NBPGR team and helped farmers to improve seed management, including storage techniques and seed quality. The establishment of the CSB was very welcome as it ensures the availability and access to new seeds at local level. Over the years, demand for seed has increased manifolds. The CSB has not been registered with any of the cooperatives.

Business model

Unfortunately, the way the seed business was set up did not prove sustainable in the long-run. When the project was active, there were no major challenges. The conservation and distribution of seeds were going very well until as long as the NBPGR continued the funding. After the project ended, the CSB was supported by funds from the *gram sabha* (village panchayat), but later this funding was withdrawn. At the moment, there is no (more) external support and activities are almost nil. Farmers found it hard to continue the operations without the external financial and technical support. The community seed bank almost “collapsed.”

Governance

It was managed by a representative group of the community under the technical backstopping of NBPGR. There was no formal bookkeeping, but records of seed collection and distribution were maintained. The seed sharing was based on the principle that each farmer will return 1.5 times the quantity of seed given to him prior to the cropping season.

Learning experience

Reflecting on the experience, the Seva Mandir team concluded that without the creation of a good business model it is difficult to run a community-based seed business or long time. They have not given though and established a new cooperative named URZA that is undertaking marketing of local crops and crop varieties. To date, it has made a very small profit.

Achievements

During the project life time (when funding support was received), many new varieties, particularly farmer varieties, were brought into the cultivation system. The skills of communities were enhanced in the production and storage of seeds. It was profitable to farmers as seed of Malan maize variety was sold at about two times the price of improved maize varieties. Seeds of new crops and varieties reached beyond the boundaries of project area. However, after the project ended, farmers lost interest and many varieties are again eroded from the area. Seed management skills and awareness about crop diversity of farmers were enhanced. During the FGD, many farmers wanted to revive the CSB, but they stated that it needs some initial support and technical backstopping to create a self-sustaining business (Image 5).



Image 5: “We were happy when the CSB was established in our area. We could obtain many new/old crops and varieties, which have been eroded from our area. But now we are not able to maintain the CSB as we don’t have funds,” said Mr. Bharion Singh (left), Manager of the CSB, accompanied by Mr. Kalu Ram, leader of the farmer group.

Credit: Alliance of Bioversity International and CIAT/J.C. Rana

Prospects for the future

Based on the discussion with local farmers in the FGD (Image 6), they expressed that they were satisfied with the initiative and still interested to take it forward. They concluded that the major reasons for the failure were:

1. Long-term sustainability is a major issue
2. Lack of long-term planning
3. No technical backstopping after the project ended
4. Not linked to the market
5. No co-financing or linkage to public institution such as KVKs
6. Lack of leadership
7. No champion/custodian farmers to lead the initiative
8. No corpus funds
9. No Farmers’ Producers Groups formed or linked to the CSB.

Overall, a good business model was not created, and thus it could not be sustained.



Image 6: View

of the FGD. Credit: S.K. Malik

BAIF Development Research Foundation Seed Savers Farmers Group, Jawhar, Palghar District, Maharashtra

Mission

BAIF (Bharatiya Agro Industries Foundation; for more information: <https://baif.org.in/>) is implementing the Maharashtra Gene Bank Project (MGBP) that focuses on participatory *in-situ* and *ex-situ* conservation, management and revival of local resources, i.e. crop landraces, livestock types, forestry species (Non-Timber Forest Products) and habitat types in selected clusters and diverse agro-climatic zones of Maharashtra. Work is in progress in eight clusters covering 92 villages across Maharashtra. The crop biodiversity component entails participatory *in-situ* and *ex-situ* conservation, management and revival of crop landraces and wild food diversity focusing on food security, risk mitigation and livelihood development. Farmers also do some participatory crop improvement, e.g. of Proso millet (Images 1 and 2).

BAIF

In 2009, BAIF started a community level Indigenous crop diversity conservation and revival programme in Jawhar, Tribal Block of Palghar district, Maharashtra through a seed savers farmer group. The Seed Savers Farmer Group, Jawhar, is a non-registered informal group of seed savers and seed producers from 16 villages in Jawhar block. They do active seed production of important landraces of rice, finger millet, little millet, tubers, hyacinth bean, cow pea, and local vegetables, on own seed savers' fields with proper care for seed quality and purity (Images 7 and 8).

Main activities

- Mapping of crop diversity and associated knowledge in diverse agro-climatic zones.
- Germplasm collection and conservation by establishing *in situ* conservation centers.
- Purification of collected germplasm and participatory varietal selection.
- Community level seed production of cultivars of target crops
- Establishment of community seed bank and initiating promotion of crop cultivars
- Marketing of seeds of rice, millet and local vegetables.
- Production and marketing of food products from wild edible species and grains.
- Capacity building for seed production, storage and organic input production.

Origin of idea

Initially through the BAIF programme, *in situ* conservation centers were established of collected germplasm of rice, finger millet, little millet, in five locations. These centers started purification of germplasm accessions with active involvement of farmers. Through field visits, knowledgeable farmers including women and old aged persons, identified unique crop cultivars for promotion through participatory varietal selection. This approach has generated great interest among farmers as a way to select crop cultivars in the field at maturity stage. Combining community knowledge and a scientific approach gives good scope for selection and promotion of unique, important crop cultivars among collected and conserved accessions. The Seed Savers Group together with BAIF scientists decided to initiate seed production of selected crop cultivars.

Community seed bank

The conservation of landraces was initiated by establishing 12 *in situ* conservation centers in 10 villages in 2010 complemented by a number of kitchen gardens. The focus crops are rice, finger millet, little millet, cow pea, hyacinth bean (lablab bean), local vegetables. However, accessions of cereals, pulses, vegetables, oil seeds, spices etc. were collected along with baseline information. At present, a total of 310 varieties of 36 crops are conserved (rice 50, finger Millet 39, little Millet 11, cow pea 9, hyacinth bean 14, and some pulses, oil seeds and local vegetables. The total number of farmers involved in the CSB is 680 men (530) and women (150).

The demand of local seeds have increased many fold over the years. Every year, the Seed Savers Group organizes seed exhibitions, wild food festivals and exposure visits to the conservation centers and seed bank, which creates demand for seed of key crop cultivars. Demand also changes over time depending on the market potential of specific landraces and climate variations. Nowadays, there is increasing demand for stress tolerant and deep-water rice varieties.

Community seed bank management and sustainability

The sustainability of a seed conservation programme requires an effective mechanism at the community level for seed selection, seed production and exchange and the establishment of an independent seed supply system at the village level. Community seed banks have been established to ensure easy access to seed for local farmers. Farmers interested in growing landraces in their fields can obtain seed from the seed bank. A seed saver committee has been formed to ensure quality seed production, management of seed exchange and establishment of market linkages.

A 10-member committee involving members from the program villages, functions as the Seed Savers Committee looking after the programme, i.e. seed production, field trainings, exposure visits, seed storage and quality (control) of produce. The Committee's role is to ensure quality seed production, management of seed exchange and establishment of market linkages. The Seed Saver Committee has the authority to monitor seed plots for quality seed production. The Committee also manages the *in situ* conservation centers. The Seed Saver Committee has the authority to monitor seed plots for quality seed production. A total of 70 farmers comprising 45 men and 25 women have been involved in seed production.

Bookkeeping operations

The Seed Saver Committee maintains records of accessions, seed procurement and seed sales, grain production etc. and is responsible to keep these records in order.

Seed production and quality assurance

The communities select important crop cultivars through a participatory seed selection method. The seed production group multiplies the seed and gives it to the interested farmers. The seed production farmers assigned their land for seed production and plots were monitored by technical staff to ensure good quality seed production. The produced seed was then deposited in the community seed bank for supply to farmers. Quality control is done through field visits at crop

maturity, harvesting and cleaning stages (seeds samples are taken from each field). Seed germination and physical purity tests are done at the seed bank level; the Seed Saver Committee visits the seed plots at different crop stages and ensures quality. Seeds produced are not labelled and branded, but an information brochure about each crop cultivar is supplied with the seeds. The seeds are not certified by government authorities, but the Seed Saver Committee certifies the seed as self-certified. Seeds are stored in grain pro bags especially designed for storing seeds.

Inputs used to produce seed

Seed production is done in farmers' fields of farmers who are keenly interested and have been trained in seed production of a specific crops and have been involved in the seed conservation programme for a long time. The inputs are shared, as detailed below:

Land: Seed producer farmers have their own land with basic facilities such as a water source.

Labor: They use their own labor (producer family) and as per need during sowing and harvesting. Storage space is rented from the village.

Money: Initially, BAIF supported through different projects and now the Seed Saver Committee is helping farmers for seed production.

Knowledge:

- BAIF provides field trainings for quality seed production at different crop stages, including field visits to seed plots. BAIF also provides trainings during seed sowing, harvesting and storage.
- Seed producer farmers are involved in participatory seed selection, seed exhibitions and exposure visits to *in situ* conservation centers and seed plots.
- Other trainings on organic input production and its use for seed production.

Technical support

- BAIF Development Research Foundation supported quality seed production through field trainings.
- Field visits of experts to conservation centers, visits to seed plots to maintain purity of crop cultivars under seed production.
- BAIF provide field trainings on seed production, disease and pest management soil health Management, participatory varietal selection, among others.

Marketing of seeds

BAIF organized a seed fair before each sowing season; sale of seeds is done at village level and also at the seed bank and BAIF centers. The pricing of seed is based on the quantity of seed produced, costs of production, marketing and promotion, and transportation expenses. BAIF regularly collects feedback on seed quality, suitability of crop cultivars, germination of seed and lodging of some of crop cultivars at maturity. Video documentaries, presentations and papers are prepared and uploaded on the BAIF Web site. ICT tools such as WhatsApp, and radio are used to spread information on the importance of indigenous crop cultivars, unique traits, grain yield, which helps to develop market linkages for seed and grains produced at village level. Each seed saver group is linked to other seed groups and BAIF organizes regular exchange visits.

Major challenges

Farmers are interested in growing a limited number of selected varieties. This makes on-farm cultivation of other landraces difficult. Nevertheless, one set of all the accessions is kept in the (*ex situ*) gene bank at the BAIF Central research station and National Gene Bank so that seed can be reused in case of an adverse condition occur. Long-term seed storage without disturbing seed viability, especially for crops such as rice, maize and sorghum, in a community seed bank is not easy. The seed germination percentage drops significantly after 2 years. Climate shifts and uncertain monsoon-patterns are leading to increased occurrences of biotic and abiotic stresses, such as drought. Other adverse environmental factors sometimes play a role, e.g. soil erosion.

Achievements of the seed saver farmers group

- The community seed bank has 310 accessions of 36 crops (rice 150, finger millet 39, little millet 11, cowpea 9, hyacinth bean 14, and other pulses, oil seeds and local vegetables).
- A database of all collected germplasm covering location details, specific information and related indigenous/traditional knowledge is maintained as an accession register.
- Documentation available of traditional agriculture practices, agriculture implements, pest and disease management practices, traditional food recipes, festivals of agro biodiversity and traditional seed and grain storage methods.
- Inventory of wild food resources (96) available with information about habitat, edible parts, method of preparation, preservation methods, present status, medicinal importance.
- Morphological characterization completed of 70 rice, 10 finger millet, 10 little millet crop cultivars; nutritional and molecular studies of 40 crop cultivars undertaken.
- Promoted different crop cultivation practices such as the Sustainable Rice Intensification (SRI) method for rice, ridge and furrow method for millets, line-sowing practice for maize, and organic input production techniques.
- Deposited 44 landraces of rice, finger millet and little millet at the National Bureau Plant Genetic Resources (NBPGR), in New Delhi, and 33 applications sent for registration to the bureau of the Protection of Plant Varieties & Farmers' Rights Authority, New Delhi (for more information, <http://www.plantauthority.gov.in/>).
- Developed a network of 700 seed savers and reached 2000 farmers through exhibitions, fairs and awareness programs.
- Promotion of indigenous crop cultivars of vegetable crops through nutrition gardens from which 1000 families benefit.
- Formed seven seed savers groups and the Biyane Samvardhan Samiti (cooperative) established and strengthened.
- Women groups have been trained to prepare value added products. The groups now produce finger millet laddus (balls), Mahua laddus, herbal coffee, herbal tea, hand ponded rice, and make a good profit.
- The nutritional evaluation of key landraces in the laboratory helped to know about the nutritional content and quality of the grains.

Results have gone to scale as well. The Seed Savers Group organized different events/workshops/trainings for farmers and others and shared crop cultivars of rice, millets and vegetables; farmers, students, NGO staff made visits to the community seed bank, the *in situ* conservation and demonstration centers. More than 5,000 people were trained and benefited. With the support of the Seed Savers Group, a new programme for five schools from Jawhar (Palghar) was started, which includes formation of eco clubs, Anandshala workshops, field projects, and school biodiversity registrar. New seed conservation, and production and marketing of rice cultivars were initiated as a result. The approach of conservation through use is directly linked to the livelihoods of communities. Rice cultivars like J.Gundi, Surti kolam, Rajghudya, Ashwini were initially almost extinct, but have now spread to a large area. Marketing of produce is taking place, which is popularizing the local varieties. This has reduced the risk of extinction.

Recognition

Men and women farmers benefited and received recognitions for their contribution to conservation and management of crop cultivar diversity:

Seed Savers Farmer Group in Jawhar, Palghar district, Maharashtra, was awarded the Plant Genome Saviour Community Award 2011-12.

Mr. Mavanji Pawar, a young Farmer Scientist in Agro-biodiversity Conservation from Chowk village in Jawhar block of Palghar District, was recognized for his outstanding work. A documentary was made about his achievements as farmer breeder and wisdom about traditional knowledge and seed

selection criteria. He bred three rice varieties and was recipient of a Genome Savior award of the PPV&FRA, New Delhi.

Mr. Sunil Kamadi - Seeds of Hope, Seeds of Future, from Kamadipada village in Jawhar block of Thane District. He is a farmer breeder and documented his approach about crop diversity, quality seed production and other achievements. He bred a rice variety and was recipient of a Genome Savior Award of the PPV&FRA, New Delhi.

Khusi Nachani sanks making women group, **Vanganpada** were recognized by padmabhusan Dr. Raghunath Mashelkar during the National Conference on Social Innovation (NCSI) 2019.



Images 7 and 8. Participatory seed selection in Proso millet and finger millet. Credits: Sanjay Patil



Images 9 and 10. Community level seed storage and seed distribution. Credits: Sanjay Patil

Costs/benefits analysis

A crop economics study was conducted in Jawhar in Palghar district to understand the costs and returns of cultivation of the indigenous crop varieties. Data on cost of cultivation, grain and straw yield and prevailing market price were collected. The crop economics study indicated that the benefit cost ratio was 1.06, 1.77 and 2.36 for rice, finger millet and little millet, respectively. The returns are mostly depending on the crop yield and prevailing market price. Now there is a good market for indigenous rice varieties such as Mahadi, Raghudya, Kolpi (prices range from 35 Rs/kg to 50 Rs/Kg) which will lead to improve benefits to farming communities.

Community Seed Network during COVID 19 - BAIF experiences

The BAIF team observed that the tribal and smallholder farmers of its project Community-led Conservation and Management of Indigenous seeds in the state of Maharashtra, were affected by the pandemic. Due to restrictions of the movement of people and the transport of goods, there was no access to agriculture inputs in general and seed in particular. In addition, the marketing of surplus produce stopped because of unavailability of transportation facilities. BAIF, under the community seed bank programme, provided access to seeds for the kharif (rainy or monsoon) season starting in July and for kitchen gardens for daily use. We distributed 96 quintals of seed of 60 crops cultivars of nine crops (rice, finger millet, little millet, maize, foxtail millet, barnyard millet sorghum, hyacinth bean, and tubers) to 2,552 families. This initiative has not only fulfilled the nutritional needs and healed the seasonal food and seed deficit of poor farmers, but has also given a sense of security to families amidst the lockdown situation prevailing due to COVID-19.

Future prospects

Sustainability of seed conservation programme requires a mechanism at the community level for seed selection, seed production and exchange and to establish an independent seed supply system at the village level. Five village-level community seed banks have been established to ensure easy access for local farmers (Image 11). Farmers interested in growing such landraces in their fields can obtain seed from the seed banks. Five Seed Savers Committees have been formed to ensure quality seed production, management of seed exchange and establish market linkages. The seed savers committee has the authority of monitoring seed plots for quality seed production.

- Demand for vegetable seeds for kitchen gardens and terrace gardens is increasing; establishing a community enterprise for production and marketing of vegetable seeds offers very good prospects.
- Developing value added products from finger millet, such as finger millet laddus, papad, malt, flakes will enhance benefits and sustainability of the group.
- Quality seed production and large-scale promotion of rice, finger millet, hyacinth bean landraces.
- There is a need to organize field training on organic input production, community level seed production, seed exhibitions in the region for promotion of important crop landraces.
- Organizing food festivals in cities like Mumbai, Pune, Nashik, will help in market promotion of indigenous produce.



Image 11. The Jewhar community seed bank. Credit: J.C. Rana

4. Uganda: Origin and development of the Joy and Family Demonstration Farm, Ngoma Kiziba Kagango Sheema, South western Uganda

Joy Mugisha, Sylvia Nyabasha, Joy and Family Demonstration Farm, Uganda
Ronnie Vernooy, the Alliance of Bioversity International and CIAT

Introduction

“We are the managers of a family seed enterprise in Uganda. Our vision is to be the leading producer of high quality and large quantity of both indigenous and improved crops. Our mission is to promote the production of indigenous crops at large scale in the country by supporting farmers through farmer trainings and workshops.” *Joy Mugisha (October 2019)*

The main objective of this family enterprise is to promote strategies for strengthening and starting up small scale, community-based seed production activities that are profitable (e.g. bean, coffee, banana, millet, maize etc.). The main activities are:

- Multiplication of indigenous/local seed (local bean seeds are getting extinct)
- Improving seed multiplication
- Seed distribution: making quality seed accessible and available to farmers at the right time and at an affordable price
- Training farmers in small-scale seed multiplication and seed business development
- Organizing local seed business farmers in production groups so that they can market and sell seeds together
- Doing research with partner organizations, such as the National Agricultural Research Organisation (NARO) and Bioversity International about beans and bananas, in particular on pests and diseases

Background

In 2005, Joy Mugisha was invited to Mukono for a workshop to represent the farmers of Bushenyi to discuss the start of the project “Conservation of crop diversity to control pests and diseases in support of sustainable agriculture”. This project, led by Bioversity International and the Plant Genetic Resources Centre (PGRC) of NARO, effectively began in March 2008. Together with four other farmers, Joy Mugisha received training in how to use crop diversity to control pests and diseases on farm. At that time, she was growing different kinds of crops, mainly bean and bananas for home consumption; farming was subsistence focused. She used to obtain seed from the local markets, neighbors and friends. When seed would become affected by pests and diseases, farmers did not realize what the cause was and what type of disease and pest it was. In the project, Joy Mugisha took part in focus group discussions and household surveys, which made her aware that some varieties were becoming rare and others were no longer grown in the area. She became aware of the high value of crop diversity.

Joy explains: “We also realized that in Uganda, the agricultural sector is dominated by small-scale farmers. Their agricultural productivity has continued to remain low, despite different interventions in the sector over the last two decades, including provision of seed of improved cultivars and agricultural advisory services.” The low productivity is influenced by continued use of home saved grains as seed (this “seed” is often genetically weak and vulnerable to stresses) and by poor quality seed from the informal seed system (fake seed is a notorious problem in the country). Common bean is one of the most important smallholder farmer crops, but its production and distribution system is weak. Farmers do not have a reliable source of planting material, availability of improved varieties is uncertain and there are worries about inconsistent seed supply at planting time. This

situation has resulted in perpetual low crop productivity further exacerbating household food insecurity and poverty.

The Bioversity International/NARO project proposed community seed banking as a means to obtain better seed quality toward sustainable improved agricultural productivity (Vernooy et al. 2015). The project focused on strengthening avenues for sustainable community-based high quality seed production and distribution of selected priority crops defined in the second National Development Plan (2015/16-2019/20). Joy explains: “I joined the Kiziba community seed bank from the very beginning and became one its leaders. Over time and with the technical support of Bioversity International and NARO, we learned how to produce good quality bean seed.”

The power of the Kiziba community seedbank

The community seedbank was officially opened on 21st June 2010 and started operations in September that year (for a detailed story of the first years, see Wasswa et al. 2015). Joy and her family received a certificate of appreciation from the government of Uganda for the initial mobilization of the community to implement the project activities. They mobilized starting seed capital from farmers in Kabwohe, some varieties from Nakaseke and Rubaya Kabale and others from the National Gene Bank of the PGRC-NARO in Entebbe. In 2010, farmers selected a committee of 10 members and Joy became the quality assurance manager of Kiziba community seed bank. Farmers from four villages joined the initiative: Rubaare, Rwenkarabo, Ntungamo and Nyamirimo. Joy and the committee started bean trials in those four villages season after season assessing and collecting data on pests and diseases, such as bean fly, anthracnose, angular leaf spot, and the effect on yield. Joy and her family were one of the host farmers of these experiments. In 2013, the bean trials were complemented by banana trials and again, Joy and the family were selected as trial host farmers. They assessed and collected data on black sigatoka and banana weevils.

To effectively transfer practical skills to farmers, use was made of demonstration gardens, which were managed by farmer groups and field days were organized to popularize the use of quality seeds to improve productivity and food security within the communities. These gardens were also used to compare the yield advantage of using quality (bean) seeds and to test novel agronomic practices to improve management. This approach was also used by NARO in other districts. According to a report by Mbarara ZARDI (2018), bean yields in the districts of Bushenyi, Sheema, Ntungamo, Isingiro and Mbarara (where demonstration gardens were introduced) increased 20-24 times after two years of experimentation. On average, yields varied between 500-700kg per acre depending on the district and the rains received. Higher yields were a strong incentive for the farmers to continue their efforts.

Reflecting on this experience and the very good results, Joy remarks: “Now we wish that the government of Uganda continues the support and invests in the scaling of this model of seed production and distribution for sustainability.” She contends that the aim should be to achieve increased availability of high quality seed for improved agricultural productivity of selected crops that meet high-end market standards and contribute to improved household food security and income.

Benefits

Joy: “Through this experience, we were able to become experts in research on pests and diseases affecting both banana and bean. We started to train other farmers on how to produce quality seed: Kabale-Rubaya Seed Bank, Nakaseke and Nakasongora farmers, Hoima Community Seed Bank, and more recently, Nyando lower and Nyando upper farmers in Kisumu, Kenya, with the support of HIVOS and the CGIAR Research Program on Climate Change, Agriculture and Food Security. It also enabled me to win the 2016 competition of best farmers in Uganda: I obtained 1st position in south-western Uganda. I was awarded a certificate, a trophy and a trip to The Netherlands supported by Vision group, the KLM airline, and the Government of the Kingdom of the Netherlands. I became known as *Joy Mugisha Beans Encyclopedia*.” (Turyatamba 2017)

According to Joy, what made her win the competition were the trainings and workshops organized by Bioversity International and NARO, plus the position they entrusted her to tirelessly carry out research on pests and diseases affecting bananas and bean and how to avoid them. Learning to produce good quality seed, especially of indigenous varieties, was crucial. Joy: “When I came back from the Netherlands, I had a chance to go to Kenya to represent a quality bean seed producer [from Uganda]. This was sponsored by Bioversity International and NARO. I also got a chance to participate in different fairs, such as the Harvest Money Expo at Nambole sponsored by Vision group and the Dutch Embassy in Uganda. In addition, we started receiving visitors from all over Uganda and outside Uganda to learn how to manage banana plantations and beans. NARO, Bioversity International and PELUM Uganda are regularly bringing farmers from different parts of Uganda to my farm for training.”

Based on the knowledge and experience gained, Joy started her own seed enterprise and seed bank known as the Joy and Family Demonstration Farm (Image 12). Family does indeed play a very important role in the enterprise: Joy’s husband and their daughter play key management roles to keep things going, in particular when Joy is away attending workshops, seminars and trainings.



Image 12. Joy Mugisha and a part of her bean collection. Credit: Bioversity International/R.Vernooy

So far, more than 30 farmers are collaborating with the enterprise/bank, which is maintaining/working with 72 varieties of bean. These farms have been trained by Joy and her family and practice agriculture more or less in the same way, based on the scientific principles taught by the Bioversity International and NARO team. Every season, Joy and the family design a production plan aimed to maintain the highest level of crop diversity possible. Diversity is more important than income in this case. Seeds harvested are divided in two: one for conservation (the seed bank) and one for commercialization (the enterprise).

In brief, the benefits obtained so far are:

- Thanks to Bioversity International and NARO, teamwork and togetherness among farmers were strengthened.
- Provision of good quality seed leading to reduced seed insecurity.
- The bean loan system returns 2kg of bean seed for 1 kg given.
- Increased income through sell of seed and farm visitation/training fee.

- Provision of seed diversity, which enables harvesting even when the weather is not very favorable, because different varieties perform well under different conditions.
- Reduced pests and diseases in the area leading to increased harvests.
- Sale of disease-free banana suckers and good quality bean seed all over Uganda.
- The demand of good quality seed has increased, not only in Uganda but also outside Uganda.

Challenges

- Not enough storage space (store) and poor transport facilitation, e.g. to attend fairs and visit other farmers to collect seed
- Limited land area for growing beans; most of the farmers grow beans in their banana plantations; aggravated by soils are getting exhausted which is leading to reduction in seed production; pests and diseases still exist in the company's plantations, i.e. banana bacterial wilt and weevils
- Lack of machinery like moisture meter to test moisture content, and crushing machine to crush organic treatment
- Lack of local preservation methods of bean seed for long time storage; packaging and value addition are still a challenge
- Joy's company seed is not certified by the Ministry of Agriculture, Animal Industry and Fisheries; making it hard to compete in the market
- Climatic changes especially pro-longed drought, heavy rains and winds, have largely affected the plantations and bean gardens
- Defaulting on seed loans
- Domestic violence against women and girls, which affects the family, company and community

Impact of Covid-19

Joy has suffered from the impact of the pandemic. She used to receive many visitors (farmers and students) from different parts of the country coming to the farm for training on different farming practices, but due to COVID-19 pandemic they no longer come. She also used to travel to participate in trainings, workshops, food/agricultural fairs and to reach out to fellow farmers for monitoring of their fields at different stages (from field preparation to harvesting and post-harvest stages), but following the Ministry of Health directives, all that is no longer possible. There has been reduced market demand for her seeds and other farm products, like matooke, since free movement for marketing has been restrained for several months. Buyers could not come to the farm either.

Faced with these challenges and difficulties caused by the pandemic she has tried to devise means to make sure that JOY & FAMILY DEMONSTRATION FARM keep standing by:

- Conducting farmer mobilization, monitoring and sharing information amongst farmers through phone calls.
- Agreeing with farmers to plant independently and then bring the sorted seed to the farm instead of planting, weeding, harvesting and sorting in groups as they used to do before Covid-19 (Image 13).
- Sticking to selling seeds and other products to the long-term customers, although prices were low (still better than seeds going bad in the stores).

Prospects

Joy's enterprise has many plans for the future: construct a storage structure and a training hall, purchase a transport facility (pickup) to help transport seed and monitor work, start packaging seed in advanced packaging materials, continuously train farmers and equip them with better farming skills, visit other farmers from other countries, create and develop a recognized demonstration and training center to mentor other farmers, and install an irrigation system in case of drought.



Image 13. Good yields result from proper plantation and garden management. Credit: Joy Mugisha

Joy's acknowledgements: I wish to thank the government of the Republic of Uganda; the donors UNEP, GEF, SDC, IFAD and PGRC, especially Dr. John Wasswa Mulumba; the entire Bioversity International team, in particular madam Rose Nankya and Gloria Otieno; Joyce Adokorach, Ministry of Agriculture; Mbazardi, especially Major Kyomugisha and Pedson Kansime; my family, especially my husband Mr. Charles Mugisha; Vision group; especially TV West; Radio West, Orumuri, DFCU bank, KLM and the Kingdom of the Netherlands. I thank the top management of NARO and all NARO staff who have supported the development of the seed banking project. Last, I thank my fellow farmers for being vigilant in implementing the initiative.

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5. The Kiziiba Community Seed Bank & Seed Cooperative, Rwengando Kiziba Kagango Sheema, South Western Uganda

Gloria Otieno, the Alliance of Bioversity International and CIAT

Sylvia Nyabasha, Kiziiba Community Seed Bank & Seed Cooperative, Uganda

Background

The Kiziba Community seedbank was established in 2008 as a joint effort between local farmers and scientists who were promoting the use of bean diversity as a means of controlling pests and diseases. The local community provided the land and Bioversity International and the National Agricultural Research Organization (NARO) contributed by constructing the building that houses the seedbank. Before its establishment, the community that it serves maintained only 13 bean varieties. Through the efforts of the National Genebank of Uganda (under NARO), an additional 46 varieties were introduced. The seedbank currently conserves 69 bean varieties and serves over 1000 farmers in 17 villages in Kiziba Parish and beyond. The seedbank was established with the aim of increasing the level of diversity of beans in the area; improving access to seeds and conservation of bean varieties that were on the verge of disappearing.

History of the seedbank

The seed bank started its operations with 60 farmers who multiplied 69 varieties of bean seed of farmer and improved varieties. Demonstration plots were then established in the villages to build the capacity of farmers on good agricultural practices, disease and pest management, seed quality assurance and crop conservation. The seed that was multiplied by farmers was then taken to the seedbank and offered for borrowing by other farmers. In this way, the number of farmers using the seedbank has gradually increased to over 1000 farmers.

In 2014, the seed bank was registered as Community Based Organization (CBO) and started operating legally as a local organization. In the same year, as part of a project on “Improving Smallholder Seed Systems for food security in Bolivia, Burkina Faso, Nepal, Uganda and Uzbekistan” led by Bioversity International, farmers were trained by a technical team from the seed inspection services of the Ministry of Agriculture Animal Husbandry and Fisheries (MAAIF) in collaboration Bioversity international on production and quality assurance of foundation seed. 48 farmers were interested in growing the foundation seed of beans for the breeding program at the National Crops Resources Research Institute(NaCRRI), with the help of the Integrated Seed Sector Development Uganda program (ISSD). As a result, in 2016, a Cooperative Society was registered for the purpose of seed production and marketing.

Main activities of Kiziba CSB and the Seed Cooperative

The main activities of Kiziiba seed bank cooperative are:

- Conservation of bean diversity – the seedbank holds 69 varieties of beans which are being maintained by the seedbank (Image 14)
- Awareness raising about the values and roles of crop diversity (Images 15 and 16)
- Seed multiplication (both local and indigenous)
- Seed production and marketing of both landraces and registered varieties through Quality Declared Seed (QDS) (20 farmers currently engaged in seed production through the seed cooperative (16 are women and 4 are men)
- Seed distribution (easy accessibility and assured availability of seed to all farmers) of mainly Beans with 69 different varieties.
- Participatory evaluation of the performance of bean varieties specifically for agronomic and nutritional characteristics

- Documentation of key landraces and their agronomic and nutritional traits through seed catalogues
- Kiziba seed bank has also become a learning platform where other seedbanks learn about seed banking and seed management practices. See: <https://www.biodiversityinternational.org/news/detail/increasing-access-to-quality-and-diverse-seed-a-journey-to-the-kiziba-community-seedbank/>
- The seedbank has also deposited 13 landraces to the national Genebank ie Plant Genetic Resources Centre where they are conserved in black boxes
- The seed bank and cooperative collaborate through contracts with the bean breeding program at NaCCRI to multiply foundation seed for newly released varieties of beans



Image 14: The first bean demonstration garden for seed production. Credit: Geoffrey Mugarura

Seed production and marketing

The Kiziba seed cooperative received QDS certification after meeting all requirements of the Seed Certification Services and started producing quality declared seed of registered bean varieties, i.e. Nabe 4, NARO Bean 1, NARO Bean 2, and NARO Bean 3 for sale. The seed cooperative also started multiplying foundation of seeds of the above-mentioned varieties for NaCCRI, which they do on a contractual basis. The table 1 below summarizes the quantities of seed produced by the cooperative in 2019 and 2020.

Table 1. Quantities of bean seed produced per variety (kg)

Variety Name	2019		2020	
	Season A	Season B	Season A	Season B
Nabe 4	-	-	320	Pending
NARO Bean 1	-	300	180	"
NARO Bean 2	550	617	600	"
NARO Bean 3	250			"
TOTAL	800	917	1100	"

Of the 800kgs that were produced in the first season (season A) of 2019, 683kgs were sold at UGX 2500 per kilogram and 117kgs were sold at UGX 2800 per kilogram. The 917kgs that were harvested in the second season (season B) of 2019 were all sold at UGX 3000 per kilogram. These prices are determined by the cooperative members every season. In the first season (season A) of 2020, total production was 1100kgs; sold were 100kgs at UGX 3800 per kilogram and the rest 1000kgs were sold at UGX 4000 per kilogram.

The seed cooperative also had an opportunity of interacting and collaborating with other seed producers in South Western Uganda sub-region under the South-western Seed Banks Association (SUSBA). In case of tenders and contracts that require much quantities of seed that cannot be produced by a single seed bank, they come together and produce under one contractual agreement hence taking advantage of economies of scale.

The business plan is comprehensive and takes into consideration different components of seed production such production and field inspections (which they pay for) as well as quality assurance after harvesting. Its development and implementation involve a committee, which is made up of a records manager, a quality assurance manager, a productions manager and marketing manager who work collaboratively throughout the whole process of seed production and post-harvest handling including packaging. The business of seed production is always farmer funded due to the fact that each farmer plants depending on their capacity.

Marketing is mainly done through participation in different food fairs and by attending different market shows, where farmers showcase different bean seed varieties and attract buyers. Besides this, value addition is a very important aspect of seed production because unpackaged seeds are sold at 4000 UGX per kilogram, but now the seed cooperative sells packaged seed at 6000 UGX per kilogram. Kiziba's seed cooperative packages its seed and puts a green (QDS certified) label on it. The green label is the official QDS certified label.

Since 2017, bean seed varieties produced for sale include; NARO bean 1, NARO bean 2, NARO bean 3, Nabe 16, Nabe 19, Nabe4, and Nabe 14. Varieties produced have varied from season to season depending on the interest of the sub-contractors and the highly demanded variety in a particular season.



Image 15: Showcasing Kiziba beans at a fair in Kenya (Nyando community seed bank). Credit: Sylvia Nyabasha



Image 16: Seed fair participation certificate

Seed source(s)

For particular seasons, seed is sourced from the Mbarara Zonal Agricultural Research and Development Institute (MbaZARDI) or from NaCCRI-Namulonge, which is accessed by booking in advance through the association (SUSBA). Since the foundation and certified seed can be reproduced at least three times during some seasons, the farmers use their own seed. 24kgs to 30kgs of foundation seed can be planted on an acre of land and when properly maintained under favorable conditions; the harvest ranges between 400 kg to 500 kg depending on the seed size. However, the yields are reducing over time due to climate changes and exhaustion of soils.

Training received

Training on QDS production was done by ISSD in collaboration with Ministry of agriculture's seed certification services and Biodiversity international. The topics covered included:

- Selecting a good seed source
- Selecting good quality seed
- Proper land preparation
- Timely planting
- Regular monitoring (which helps to tell off-types, identify the affected crops)
- Timely weeding and spraying

- Timely harvesting (don't allow seeds to over dry in the garden as they be attacked by weevils from there and you may as lose some seed in the processing of harvesting over dried seeds)
- Proper post-harvest handling.

NaCRRI takes a sample of seeds every year for certification and gives the farmers a certificate plus a green label indicating that the seed is QDS (Image 17).

Rules and regulations

- For the QDS varieties, nothing else should be grown in the garden; if there is a neighbouring garden with similar crop, there should be a spacing of t 3 meters between those gardens. This is done to avoid the mixing of varieties.
- Farmers must plant in lines in order to not damage crops during weeding and monitoring.
- Spraying must be done at least twice per cycle (at maturity and podding stages)
- Seed must be sold at a uniform price.

In the seed production group of 20 farmers, every farmer has its own seed, because each farmer produces its seed individually; however, after threshing, all farmers are required to bring the seed to seedbank for proper post-harvest handling until when it is sold. When seed is brought to the seed bank, it is first checked for quality, whether it is dry enough for storage and meets all the requirements; it is then weighed, recorded and locally preserved.

FORM 59/104

Ministry of Agriculture
Nairobi, Kenya
National Seed Certification Service

OFFICIAL SEED TEST RESULTS CERTIFICATE

Date Received: 27/11/2014

Lot Number: 100/2402/2014/173

Crop Species and Variety: BEAN (LUSIYA) (LUSIYA)

County of Origin: Nyeri

PURITY		GERMINATION CAPACITY (%)					PURITY	
Sub Sample No.	Wt. Moist.	Other Crop Seeds	Wt. Seeds	% Germl.	Final Count	Hard	Fresh Ungerm.	Rotten
00	6.0	0.0	0.0	100	100	0	0	0
%	%	%	%	%	%	%	%	%

NOTE: Marketable non-moisture

Good seed germination

NATIONAL SEED TESTING LABORATORY

Technical Administrator

Image 17: Seed quality certificate



Image 18: Local seed business certificate

Challenges

- Concerning seed preservation, due to the increase in the seed quantity produced, the local preservation method of using burnt cow dung is no longer efficient.
- The number of producer defaulters has increased even though there have always been ex-officials on the seed committee to help recover from defaulters. Defaulter disrupt the seed production planning process.
- Concerning storage, due to the increasing seed quantities produced, the storage facility is becoming too small to accommodate the seed produced.
- Limited facilitation to visit and monitor farmers' gardens, especially during the period of COVID-19.
- Climate changes are causing unstable conditions, such as the prolonged droughts and heavy rains are challenging.
- Pests and diseases still attack crops.

Some measures have been put in place to deal with these challenges:

- Seed diversity has helped in managing the ever-changing climatic conditions because different varieties perform differently under different climatic conditions.
- Decentralisation of the monitoring process is improving efficiency and quality (farmers who stay in the same area always monitor each other's gardens).
- Engaging farmers in search for more local treatments.
- ISSD gives a hand in covering transport costs to avail seeds to the market shows; besides, the remaining seed is sold after distribution, which helps to raise funds to carry out some of the seed bank operations.

Achievements

- Since 2008, steady progress in development of the seed bank, from a small group of four up to now when operating as seed bank cooperative (Image 18).
- Assured seed accessibility to the farmers.
- Farmers, including women, have become experts in seed production
- Production of certified seed (Images 19-21).
- Friendship and connections with other seed producing sites.
- The issues of malnourishment among especially among the children were dealt with due to diversity of bean varieties that were available for most of the household to consume.

Benefits

Most farmers in Kiziiba parish have benefited from the seed bank cooperative in different ways:

- Better access to seeds, i.e. seeds of a wide range of diversity is more available through a more affordable means.
- Training and capacity development of farmers on various issues such as production of quality seeds and post-harvest handling which have helped them with disease management.
- Participating in different agricultural food fairs, which has always exposed farmers to a range of opportunities.
- Increased income in farmers' households through the sale of bean seeds.
- Access to a wider diversity of beans has helped farmers cope with the effects of climate change, especially so because different varieties perform differently under different climatic conditions.
- Through venturing into foundation seed production in collaboration with NaCCRI farmers not only have access to more diversity, but they have also participated in the dissemination of new varieties and their testing.

Future prospects

- The farmers have planned to develop the seed bank/cooperative into a Savings and Credit Cooperative (SACCO) to allow farmers to have access to savings and credit facilities to expand their production.
- The farmers also plan to include other crops like banana, maize, coffee and millet to the seed production business.





Images 19-21: Seed collection, example of QDS and bags used for QDS. Credits: Sylvia Nyabasha

6. Nepal: The Agyauli community seed enterprise, Nawalparasi, Nepal

Ronnie Vernooy, the Alliance of Bioversity International and CIAT

Pitambar Shrestha, Local Initiatives for Biodiversity, Research and Development (LI-BIRD), Nepal

The Agyauli Community Seedbank was established in 2008 with the technical support and facilitation of LI-BIRD and financial support of NORAD through the Development Fund, Norway I-BIRD (Box 2). It is located in the central southern region of Nepal representing the inner terai region (the low attitude part of the country). Over the years, it has become a well-managed community seedbank, which is often presented as a 'good practice model' to follow/learn from. What contributes to a good functioning community seedbank (Shrestha and Rana 2018)?

- Committed leadership and a strong ownership feeling by the community.
- Community seedbank members are some receiving economic benefits from the activities.
- It has developed a functional collaboration with public, private and civil society organizations.
- It produces seeds in volume and has developed marketing tricks and tips.
- It has a high level of interactions with the 'outside world' and has received strong capacity building support.
- It has developed a mechanism to sustain operations over the longer run, such as an internal mechanism for generating financial resources.

In 2018, the community seedbank conserved 25 crop species (rice is the number one in importance) and a total of 54 local varieties (Shrestha and Rana 2018). The CSB is managed by the Agriculture Development and Conservation Farmers Committee, a group of committed farmers from the area. The committee works with many other organizations. The activities of this committee were started involving 35 farmer members in 2008. At present, there are 953 farmer members. The committee was registered at the District Administration Office in 2014. Later, the municipality donated a parcel of land for operating community seedbank and constructed a meeting room, storage room; in 2019, additional storage facilities were constructed for seed storage and selling. LI-BIRD supported the committee with an initial amount of Rs. 250,000 to establish a community biodiversity management fund. This fund has now increased to a sum of Rs. 900,000 (about US \$ 7,700). The society gives loan to members at 12% interest up to Rs. 30,000/per member. This money must be used production activities primarily related to agricultural and livestock that generates income for the members. Farmers benefited from the loan through rearing pigs, buffalos, and banana cultivation. The interest generated through mobilization of the fund is used for the staff salary and other operational cost of the committee including management of community seed banks.

Box 2. LI-BIRD's approach and experience

Since 2003, LI-BIRD has been involved in promoting community seedbanks in Nepal and South Asia as an effective approach for on-farm management of agricultural biodiversity and as a means to provide easy access to diverse types of quality seed and planting material. Community seedbanks supported by LI-BIRD are governed and managed by a farmers' group, cooperative or organization (e.g. committee). Based on more than 20 years of work on community seedbanks in Nepal, LI-BIRD has demonstrated that community seed banking can be a successful approach. Community seedbanks can promote food sovereignty given that they provide options to farmers to choose from different types of seed and planting material depending on the types of land they have and crop varieties they would like to grow in their home garden and farm.

To a certain extent, community seed banks promoted by LI-BIRD are contributing to enhancing food and nutrition security, generating local employment, strengthening local seed systems and improving income and livelihoods of local people. The drivers of success of LI-BIRD's approach to community seed banking in Nepal are empowerment of farmers and their organization and the introduction of innovative sustainability mechanisms.

Source: Adapted from Shrestha and Rana 2018.

Producing and selling seed by the Agriculture Development and Conservation Farmers Committee was first started in 2015 as a means to generate income for local farmers (members of the community seedbank) and support for the Agyauli community seedbank's operations. In 2015, three rice varieties were marketed for a total of about 27 Ton (the plan was 20 Ton), production increased to 45 Ton in 2017, in 2018 to seven varieties (production dropped to 25 Ton) and this year (2019), to eight varieties. In 2018, 26 farmers were involved in seed production for community seedbanks. The drop in 2018 was due to irregular seed inspection by the technician in charge: part of the harvest could not be certified. In the group discussion, participants stressed the need for professional support by skillful people. When this support is not delivered then farmers suffer immediately.

This increase in number reflects both a stronger demand over the years and a stronger capacity to respond to this demand. Originally, common rice varieties were marketed based on the assumption that the demand for these was highest. However, after interactions with National Agricultural Research Council (NARC) scientists, some new (to the region) varieties were introduced and tested on a small scale in farmers' fields.

The seed producing farmers received technical training from the then DADO office (the extension office). The DADO office and the Anamol Seed Company are the providers of source seeds. Production plans are discussed at the Municipal Office with relevant officials. These entities form the institutional landscape in which the seed production/marketing operates.

Based on discussions with these entities the price of the seed is determined. It is a real price based on actual production costs, but a bit below the market price –this is done as an incentive for local farmers to make it attractive to buy seeds locally. According to Shrestha (2018), it is possible for a community seed bank to sell seed at a lower price compared to other sources because: i) they are service oriented; ii) the physical infrastructure is built with external support; iii) operational costs are low given that members are volunteers and only a few local staff are contracted. Seeds are produced through an informal agreement with the member farmers; no contract is signed. The sales of seeds are monitored and each year, the seed management team does some kind of market survey to find out what the demand is. The major buyers of seed are Anamol and three other seed companies complemented by about 150 farmer buyers.

According to the interviewees, so far, the seed business has been very successful and the plan is to expand production to 100 or even 200 tons. In 2016, total sales were worth about 12,000,000 NPR (or about US \$ 10,000). In 2018, the net profit was about 70,000 NPR. A major challenge is to find a permanent local technician who can support the process technically and assist when there is a problem. Other challenges include the lack of water and the need to improve the technical equipment (e.g. they would like to purchase a new tractor). One promising crop other than rice is cowpea for which one of the seed enterprises has a strong demand. In 2018, a first cowpea seed trial was done with production of about 100 kg of seed. Although there is also demand for wheat, there is not enough water to produce wheat in large volumes; in addition, the rhinos that live in the surrounding areas are difficult to control.

The seed enterprise is largely a women's business, run and managed by women farmers. This has been so from the start. As one of the woman interviewees observed: "We women lead the enterprise. We are much more careful than the men. We do not drink and do not use the money for inappropriate purposes." (Images 22 and 23)

The Agyauli community seed enterprise is not the only community seedbank based seed enterprise in Nepal. LI-BIRD has supported a number of them. Table 1 presents the quantity of local and improved varieties seed produced by the community seedbanks supported by LI-BIRD's Community Biodiversity Management South Asia program in Nepal in between 2012 and 2016. The quantity increased significantly from 4.49 tons in 2012 to 140.56 tons in 2016. According to Shrestha and Rana (2018), this increase was due to: i) over the years, community seedbanks gained confidence in seed production, handling and marketing; ii) development of physical infrastructure, such as seed storage, threshing and drying floor, procurement of small machinery; iii) increased seed demand due to better quality and lower price compared to other sources and; iv) expansion of the market due to demand from district extension offices, private seed entrepreneurs and companies, and NGOs. LI-BIRD's experience demonstrates that farmers who successfully manage a community seedbank have the capability to also run an effective and profitable seed enterprise.

Table 1: Quantity of seed produced by six community seedbanks supported by LI-BIRD (2012-2016)

Year	Quantity of seed produced (Ton)		
	Local varieties	Improved Varieties	Total quantity
2012	0.2	4.3	4.49
2013	4.4	11.3	15.71
2014	11.1	83.9	95.03
2015	10.0	124.8	134.79
2016	21.7	118.9	140.56

Source: Adapted from Shrestha and Rana (2018)



Image 22: Leaders of the seed cooperative inspect the rice diversity block. Credit: Bioversity International/R.Vernooy

Impact of Covid-19

The COVID-19 pandemic has had a great impact on the marginalized groups, in particular the migrant workers, informal sector workers, women, youth, and other disadvantaged groups. They are among the most vulnerable and most affected. The people lost their jobs, wages, or experienced a decreased income, which has led to increased food and nutrition insecurity, aggravated by the partial or full closure of businesses/ enterprises during the lockdown period. In Nepal, 1 out of 10 households is reporting a loss of livelihood and 3 out of 10 households a reduction in income (according to the World Food Program in the country). The loss of income was found to be more common among households whose livelihoods were dependent on daily wage labourers, migrant workers, and households with a disabled person. Similarly, food and nutrition insecurity were more common among households whose main income source was daily wage labour and those who had less diversified livelihood strategies. Province 5, Karnali and Sudurpaschim Provinces are the most affected, with the highest reported loss of and reduction in income. The farmers of Agyauli, who mostly rely on their farming activities, have been less affected than the groups mentioned above, but the mobility restrictions have made farming, including the conservation efforts of the community seed bank and the seed production and marketing efforts, more difficult. Seed fairs and other community-based seed activities have had to be postponed.

Acknowledgement

This case study is based on a focus group discussion held in Nawalparasi (16 May 2019) with Mr Uttar Kumar Sigdel, Ms Droupati Basnet and Ms Parbati Bhandani (members of the seed committee) and Pitambar Shrestha (LI-BIRD). We thank them for their time and efforts.



Image 23. Leaders of the Agyauli community seed enterprise. Credit: LI-BIRD/P. Shrestha

Reference

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7. Zimbabwe: seed as a viable business

Ronnie Vernooy, the Alliance of Bioversity International and CIAT

Hilton Mbozi, Community Technology Development Organization (CTDO), Zimbabwe

“Our interest in producing seed is motivated by the strong demand in our area for small grains. This demand is triggered by climate change, which requires new varieties that are better adapted to irregular rainfall and drought. At the same time we observed that the hybrids from the seed companies were no longer viable.” (Woman farmer from Chemazumba, focus group discussion 29 March 2019)

The Community Technology Development Organization (CTDO)¹

CTDO was established in 1993 as a non-government organization with a head office in Harare. Over the years, it has grown and now has offices in Zimbabwe and Zambia with a total staff of over 90 people. Its mission is to achieve poverty alleviation and sustainable development of marginalized communities by building farmer and household livelihoods capacities through research, technology innovation, technology packaging and dissemination, policy advocacy and lobbying, and knowledge management, through gender-sensitive and people-centred approaches. It works on four major themes: food security; environment; agrobiodiversity; and policy and advocacy. CTDO was one of the pioneers of community seed banking in Africa and globally, establishing community seedbanks in tandem with the introduction of the Farmer Field School approach.

In 1998, with financial support from the Development Fund of Norway, CTDO established three community seedbanks on a pilot project basis in Uzumba-Maramba-Pfungwe (known as UMP), Tsholotsho and Chiredzi districts. The community contributed local building materials, and the Ministry of Agriculture’s Institute of Engineering provided the technical design. In later years, other community seedbanks were established (by the middle of 2019 there were 14); the most recent one in 2017 in **Chemazumba (in UMP)** with Dutch funding. The objectives of the community seedbanks were to: 1) promote knowledge and seed exchange; 2) facilitate local crop experimentation by farmers; and 3) store germplasm of importance to the communities. As such, community seed banks are seen as a collective framework and institutional platform for local decision making and a mechanism to implement farmers’ rights as defined by the International Treaty on Plant Genetic Resources for Food and Agriculture (Mushita et al. 2015). CTDO not only operates in Zimbabwe, but also in Zambia (Box 3.) In 2017, CTDO launched the Champion Farmer Seeds Cooperative Company.

Box 3. CTDO in Zambia

CTDO also works in three districts of Zambia: Chikankata, Rufunsa and Shibuyunji. One of the CSB established there is in Muvela village located in the Ndezwe agriculture camp of Chikankata in the Southern province of the country. This CSB aims to contribute to the food and nutrition security of rural households through improving the management of the diversity of local crops like sorghum, millet and cowpea. CTDO assists farmers to adapt to climate change through a targeted set of high impact activities on the conservation and sustainable use of plant genetic resources for food and agriculture. The CSB is managed by the community members, based on a locally developed constitution, which should be followed by all members. The CSB is led by a selected executive committee. The constitution guides the community members on how to access seed. All committee members are volunteers and do not receive a salary; at this moment the CSB is not run as a business. CTDO provides regular training of CSB members. Before 2020, the community only had a temporal

¹ For more information: <http://www.ctdt.co.zw/>

building for seed storage but now a better and modern building has been completed and is ready to operate as a standard community seed bank.

Community seed multiplication has become an annual routine in the target community in the districts. More than 50 farmers have participated in multiplying seed on behalf of their community for distributing seed of 106 accessions of crops including Bambara nut, cowpea, sorghum and millets and local maize varieties.

Contributed by Dennis ChosadziwaTonga, Seed Control and Certification Institute, Kasama, Zambia

The origins of organized farmer seed production

CTDO first stimulated organized farmer seed production and distribution in the 1990s, but initial attempts were not very successful. The severe drought of 1991/1992 had a devastating impact on many communities. At the same time, farmers were used to the government-led input schemes, which did not encourage farmers' own initiative, despite the often poor results of the recommended practices and seeds. Interviewed farmers expressed dismay about the schemes and called them a failure. They also mentioned that the big commercial seed companies were and still are not interested to produce and sell seed of so-called minor crops, such as millets. Seed multiplication activities have deliberately targeted open-pollinated varieties of such crops as sorghum, pearl millet, cowpeas and maize. Farmers have received training on seed multiplication and seed production methods.

Only after the establishment of the first three community seedbanks (among which the one in Uzumba-Maramba-Pfungwe **district** located in the dry region of the country with 400-450 mm/year), more systematic seed-focused capacity development work was done. Subsequently, this was further improved through the Farmer Field School (FFS) approach. FFSs allow farmers, through a collective process of action learning, to develop crop varieties with preferred traits.

The seed production method introduced was the so-called cluster method (Vernooy et al. 2019). In this method, farmers take responsibility for producing seed of one to four crops in an area ranging from 0.2 to 0.6 ha. (They plant larger areas for food production.) Over the years, the (same) FFS farmers who first focused on crop improvement have "graduated" to the more demanding task of seed production. The leaders of clusters coordinate activities and form a kind of cluster association to bring seed production to scale. "We first work as a family, discuss and plan things. We reflect on what we did last year. We rotate the crops. Then we work together in clusters. We monitor each other and do quality control." Right now, crops include Bambara nut, cowpea, groundnut, pearl millet, finger millet, maize (open pollinated varieties and in some cases, hybrids) and sorghum.

In many communities, seed produced through this method is sold locally, individually, but via the community seedbank, at seed fairs and during field days. CTDO and AGRITEX provide technical support. Farmers have been trained by Agritex and CTDO in the technical aspects of managing all the stages of seed production. One of the woman seed producers observed: "In the beginning it was not so easy, but over time we have become more expert in handling things like isolation, spacing, soil fertility, agronomic management, trait identification, grading of seeds, including for cross-pollinating crops. We now know the difference between seed and grain." The community seedbank management team carries out the role of quality controller and also guides seed producers in the setting of the price of seed.

Farmers from the UMP community seedbank explained that this form of seed production has first of all a social function: to make sure that everyone has access to good quality seed of crops important for smallholder farmers and neglected by the large seed companies.

There is strong demand for farmer-produced seed of small grains in UMP (e.g. sorghum and millets), which in recent years has increased due to climate change and to a growing demand from

consumers in the towns for nutritious and healthy food. One of the interviewees remarked that hybrid seed was no longer performing well under the changing climatic conditions, creating problems for many farmers. This encouraged farmers to rely more on own seed production. A challenge, however, was the disappearance of many traditional varieties from the area. FFSs have put the restoration and improvement of “lost” varieties high on the agenda.

The roles of community seed banks

This is where the community seed banks come in, since they are maintaining stocks of many local varieties. Remarkably, by maintaining these stocks (originally in the first place for conservation purpose), the community seedbanks also serve as a seed demand ‘generator.’ This function is reinforced through the organization of regular seed fairs where community seedbanks display their complete collection. One woman farmer remarked when comparing the functioning of seed companies with community seedbanks: “The community seedbank is putting seed in the hands of *all* farmers.” In the words of the Agritex officer: “It is a social meeting place for everyone.” To set priorities for seed production, farmers of the Farmer Field Schools used the diversity wheel to identify varieties under pressure of becoming lost in the area. FFS also try to gather information about seed demand.

In the community seedbank, all seed containers have tags with the date of harvesting, the crop/variety name, the name of the farmer who contributed the seed, the name of the village, and the phone number of the farmer. The inclusion of the phone number seems trivial, but it is not: it allows farmers who visit the community seedbank and spot a variety of interest to immediately call the farmer who contributed the variety. It also serve as a monitoring tool: when seeds in a particular container go bad, the contributor can be warned and asked to take action.

In 2017, Chemazumba community seedbank produced seed of maize (OPVs), cowpea, groundnut, pearl millet and sorghum. Some farmers seed producers focus on one crop, some do two or three. Altogether, they produce enough seed to satisfy demand. Over time, farmers observe important changes. For example, varieties are adapting to the changing climate: nowadays there are more early maturing varieties. Another example: due to recurrent droughts, the areas of cowpea and sorghum seed production are increasing while the area of maize is decreasing. Finger millet seed has been in high demand; although the crop does better with good rainfall, it can still yield well under dryer conditions.

Interviewed seed producers mentioned a number of challenges: pests and diseases, birds, (sometimes) irregular delivery and high prices of inputs, lack of labour for ploughing and mulching, drought (at the time of the FGD the country has been hit by a 46 days dry spell) and other weather vagaries.

Going to scale: Champion Farmer Seeds

In order to expand farmer-led seed system development on a larger scale, CTDO in partnership with Oxfam Novib, recently developed another initiative: the establishment of the Champion Farmer Seeds Cooperative Company (known as Champions Seeds), formally registered in 2016 and launched in 2017 (Oxfam Novib developed the seed business model for the company, Manicad 2016). Building on the rich experiences of the community seed banks supported by CTDO, Champion Seeds is both a commercial and social enterprise, with farmers as shareholders, producers (on a contract basis) and buyers of high quality, certified seed of highly adaptable and high yielding varieties of dryland grains and legumes. CTDO is leading the roll out of the company. Other factors that played a role to establish Champions Seeds were the high price of seed on the commercial markets and the desire of farmers to become more food secure through increased seed security.

Interviewed farmers expressed satisfaction about the company’s platform function, which allows meaningful participation of farmer seed producers, many of whom are members of a FFS and thus, experienced crop improvers. In this way, Champions Seeds benefits from both the social and seed

capital built up over the years: improved varieties developed over time by the FFSs are making their way to the company.

Champion Seeds works on contract basis with seed individual producers whether or not belonging to a community seed bank. Hence, community seed banks are not contracted, but their members are seen as important buyers of seed (customers). The company provides inputs (including foundation seed); the farmers provide labour and technical knowhow. The costs of the inputs are deducted from the sales.

Seed quality assurance

For any seed company, but in particular for one entering the market, delivering seed of high quality is a must (Mushita and Vernooy 2019). Champion Seeds, as a registered seed company, has to abide by the laws of Zimbabwe with regard to its seed production. Concerned seed quality, the company follows guidelines set by the Seed Certification Scheme notice, 2000. This notice sets out minimum standards required in seed production to ensure that seed quality is maintained and standards adhered to. Some of the elements included in the notice include crop rotations, isolation distances, rouging of off types and general crop management. To ensure that high quality is maintained, the company provides basic seed to farmers. This ensures that the farmer grows only true to type seed. During the growing period of the crop, field visits are carried out by the company's personal to ensure that the farmer is adhering to the standards set. In addition, all seed crops grown in Zimbabwe, as enshrined by the Seed Certification Scheme, have to be inspected at least twice by government seed inspectors before they are harvested (Images 24-27).

Inspections are also carried out during harvesting, packing and storage phases, in situ, thus at farmer's homes to ensure there are no admixtures with other crop varieties. All bags are labelled with the farmer name and crop variety. Nametags are attached to each bag and placed inside the bag to allow traceability if needed. Another requirement of the notice of 2000 is that all seed should be tested for purity and germination in a government certified laboratory before it is sold. After treating and packing by Champion Seeds, all bags are carefully labelled indicating the variety name and inside each bag, another nametag is placed. This tag includes information about the name of the variety, purity and germination test results, and year of testing.

Now in its third year and still benefitting from donor support, the company is making good progress toward organization and financial sustainability. In its first two years of operation, the company produced almost 150,000 MT of certified seed. Farmer shareholders/seed producers from Chemazumba expressed satisfaction about their involvement in Champion Seeds. As a woman farmer expressed: "We are earning money from the seed production and I can now pay the school fees for my children."

Current crops/varieties portfolio of Champion Seeds (Images 22-223):

- Maize: Hybrid ZS265, OPV 521, OPV 309
- Sorghum: Macia (photos 1 and 2), SV4
- Pearl millet: Okashana 1
- Cowpeas: CBC 2
- Beans: NUA 45, Sweet Violet
- Groundnuts: Ilanda, Njiva, Guinea fowl
- Champion Seeds has 2 new maize OPV varieties under trials, which will be exclusively of the company: Shasha 301, Shasha 302

Achievements

Farmer seed producers list many positive outcomes that have resulted from their production and marketing efforts (Images 25-27). They have increased their seed related knowledge and skills, the quality of seed has improved and, as a result, yields have become bigger. "We now longer have limits to grow crops and we can save some money to buy things for our children." They have developed marketing knowhow and found markets to sell their products. They feel that they have

been empowered and no longer are dependent on commercial seed companies. This independence is mentioned several times during the FGD. They are recognized in the communities as bona fide seed producers. Another important benefit mentioned is that the community seedbanks provide a safe space to keep seeds –not only technically, but also consumption wise. The experience has also made them realize that they can cherish other dreams: producing and selling seeds themselves (instead of to Champion Seeds) and earning more money. They said that they can develop a business plan, do all the costing themselves and register as a new company. Some even dream about exporting seed to South Africa.

Impact of Covid-19

Despite the pandemic, which also hit Zimbabwe badly, some community seed bank activities have continued. The smallholder farmers participating in community seed banking activities, including seed production, have demonstrated increased resilience in the face of this massive disruption. The pandemic started when the season was tailing off and key activities such as seed inspection, harvesting and germplasm collection had already been conducted. Seed collection at the seed banks was done as growers delivered the seed in small groups of five growers at a time. This was done under strict adherence to Covid-19 regulations. Champion Seeds used the community seed banks as selling points. A total of 83MT of climate smart seed varieties were made available on the market, mainly to community seed banks. This was critical as farmers managed to access seed on time without having to travel to markets in towns. The sale of seed at the community seed banks was also done following Covid-19 regulations. Farmers were organized in small groups, respecting the rule of social distancing. However, seed fairs were disrupted and delayed due to the pandemic, as the country instituted lock-down measures. It is expected that seed fairs will soon be organized again, as key events for the exchange/sale of seed.



Images 24 and 25: Production and grading of Macia (an open-pollinated, white sorghum variety first released by ICRISAT). Credit: Champion Seeds

Acknowledgement

This case study is based on a focus group discussion with 16 seed producers (10 women, 6 men) belonging to two community seedbanks in the UMP district of Zimbabwe (Chibika and Chemazumba), two local leaders, one Agritex officer and with the facilitation and translation by Hilton Mbozi (CTDO). 29 March 2019, Chemazumba, UMP. We thank them for their time and efforts.



Images 26-27: Champion Seeds products. Credit: Hilton Mbozi.

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8. Conclusions

Ronnie Vernooy, the Alliance of Bioversity International and CIAT

The case studies point to the viability of community seed banks as seed producers and distributors, but becoming successful is not easy and depends on several factors. Initial technical and financial support provided by a committed and experienced organization (such as BAIF and ASA in India, LI-BIRD in Nepal, NARO and Bioversity International in Uganda, CTDI in Zimbabwe) can facilitate the effective start-up and early development of the enterprise. Not surprisingly, smallholder farmers often lack the technical, financial and organizational capacities to kick-start a company and scale seed production and distribution to a level beyond the household and community levels. To make this big step requires some form of guidance and support. It also requires time, as setting up the infrastructure, organization and market relationships cannot be done overnight.

The case studies demonstrate that development of a sound business plan from the start can make all the difference, but the use of blue-prints should be avoided. In fact, from the case studies several interesting models emerge. In India, the farmer producer company model has been tried and proven with success. This model is based on the development of yearly business plans. The business plan is fairly comprehensive and takes into consideration different components of the seed value chain, such as input procurement, seed production and commodity trading. The development of the business plan involves the Board of Directors, a few members of the FPO, staff of the FPO and key members of the NGO that supports the initiative (ASA). Key performance indicators are developed on a half yearly, quarterly and monthly basis to assess progress. BoD members, apart from monitoring the business progress on a quarterly basis, also look at compliance. At critical junctures, bylaws are reviewed and necessary changes are made. A trained team does the daily bookkeeping. This looks very much like a healthy enterprise set-up.

In Nepal, production and sales of seed by the Agriculture Development and Conservation Farmers Committee was first started in 2015 as a means to generate income for local farmers (members of the community seedbank) and support for the Agyauli community seedbank's operations in particular. In 2015, with the technical support of LI-BIRD, three improved rice varieties were marketed for a total of about 27 tons. Since then, production and sales volumes have seen an upward trend, based on growing demand for the varieties on sale. After interactions with NARC scientists, some new (to the region) varieties were introduced and tested on a small scale in farmers' fields. An example is Jhinuwa. The plan is to expand the area of Jhinuwa and explore further diversification of crops and varieties.

The Joy and Family Demonstration Farm in Uganda is another example of a home-grown experience, with roots in a community seed bank, but now on a track of novel enterprise development. This case study demonstrates that nothing is impossible, and that dedication and expertise combined with sound and timely technical support and clever social networking can be instrumental in effective seed enterprise development. The Kiziiba case is another example of a specialized seed enterprise that emerged from a community seed bank, owing its relative success to very good relationships with entities of the formal seed sector. The two Uganda cases also help to understand the importance of the institutional context made up of government research and extension, policies and laws. In Uganda, overall, there is an open and supportive institutional context, which recognizes and provides space for multiple seed actors and activities, beyond the conventional commercial sector. Very few countries have clear and supportive rules and regulations in place that encourage, recognize, facilitate and guide community-based seed entrepreneurship, such as spearheaded by (members of) community seed banks.

In Zimbabwe, a unique model is pursued through the establishment of the Champion Farmer Seeds Cooperative Company (known as Champions Seeds), formally registered in 2016 and launched in 2017 (the INGO Oxfam Novib developed the seed business model for the company based on a review of seed enterprises around the world). This company builds on the rich experiences of the

community seedbanks supported by CTDO, but has an independent status. Champion Seeds is both a commercial and social enterprise, with farmers (including community seed bank members) as shareholders, producers (on a contract basis) and buyers of high quality, certified seed of highly adaptable and high yielding varieties of dryland grains and legumes. Champion Seeds not only sells (improved) farmer varieties, but hybrids as well. This mix of seed types on sale can be seen as a clever marketing diversification strategy. It is too early to tell if this model will be successful in the context of Zimbabwe, but it certainly is an example of innovative entrepreneurial design.

The case studies suggest that conservation of agrobiodiversity can be combined with and benefit from seed production and distribution. However, success seems to require an even broader set of mutually supportive activities, which together span the whole seed value chain. Developing a seed value chain perspective requires time and effort (and learning by doing). From Joy Mugisha's case, the following activities appear exemplary:

- Well planned multiplication of indigenous/local seeds
- Seed conservation (on-farm, in a community seed bank)
- Organizing local seed business farmers in production groups so that they can market and sell seeds together
- Seed distribution of promising/interesting/high value varieties: making quality seed accessible and available to farmers at the right time and at an affordable price
- Training farmers in all aspects of seed business development
- Organizing local seed business farmers in production groups so that they can market and sell seeds together
- Doing research with partner organizations, such as the National Agricultural Research Organisation (NARO) and Bioversity International about crops, e.g. on pests and diseases, crop improvement, value addition
- Awareness raising activities (seed fairs, workshops, conferences)
- Advocacy activities to create more space and support for farmer seed entrepreneurship

It seems wise to consider this menu from the start and integrate elements in the very first business plan.

ANNEX. Questionnaire

Basic information

- Year of establishment as community seed bank?
- Main activities?
- Which crops?
- Size of the community seed banks in terms of number of crops and varieties conserved?
- Year of start of seed production?
- Number of active members involved in the CSB (women / men)?
- Number of active members involved in seed production (women / men)?
- Is the community seed bank formally registered/legalized as such or in another way (e.g. cooperative)? What about the seed production unit as such?

About seed production and marketing

What was the motivation to start producing seed? Whose idea was it? Is it supply or demand driven? If demand driven, how is demand assessed? Has demand changed over time? If supply driven, who decides? Based on what?

Was a business plan developed? Who was involved? What did it look like in terms of:

(1) the governance model; (2) the book-keeping operations; (3) the revenue model; (4) the business strategy; and (5) the marketing plan

Any previous experience with producing and marketing something? If so, what was learned from the experience?

Seed of what crop varieties are produced? Has this changed over time? If so, why?

What is/are the source(s) of seed: the community seed bank, other source(s)? If other, how are source seeds obtained?

What area is sown? What is the yield? Has this changed over time? If so, why?

What are the inputs used to produce seed and how are they obtained (owned, rented, borrowed); under what conditions?

- Land?
- Labor?
- Money?
- Knowledge?
- Technologies, machineries and tools?
- Source seed?
- Technical support?

Was training received? By whom, when and how? What was the result?

How is the seed production work organized (women / men, youth) from beginning to end? How is quality control done? How are seeds labelled/branded? Are they certified? If so, by whom and how?

How is the marketing process organized? How is the price determined? In what geographical area are seeds marketed? Through what channel(s)?

Is feedback from seed customers obtained? How? Is the feedback being used?

Are ICTs used and / or local radio? For what purpose (obtaining information, distributing information, making payments)?

What rules and regulations need to be taken into account? How do they influence seed production and marketing? Who owns the seed produced? Are seeds protected in one way or another?

Is the seed production activity/group linked to other seed production groups? To a private company? To a national or international agricultural organization?

What have been/are the challenges? How were they dealt with?

What have been the achievements to date? Is it profitable? Has this changed over time?

Who has benefited (women / men, youth)? What has been done with the profit?

Have there been non-monetary benefits, for example, strengthened organizational or entrepreneurial capacities or more recognition and respect or more involvement in community activities? For whom (women / men)?

Have other farmers benefited from the experience/expertise and lessons learned? How?

Does the seed production and marketing relate to the conservation efforts of the community seed banks? If so, how?

Has seed production and marketing been complemented by participatory variety selection? How? What has been the result?

Has a costs/benefits analysis been made of the whole production and marketing process? Has the costs/benefits ration changed over time? If so, why?

What are the prospects for the future?

About CRP-GLDC

The CGIAR Research Program on Grain Legumes and Dryland Cereals (CRP-GLDC) brings together research on seven legumes (chickpea, cowpea, pigeonpea, groundnut, lentil, soybean and common bean) and three cereals (pearl millet, finger millet and sorghum) to deliver improved livelihoods and nutrition by prioritizing demand driven innovations to increase production and market opportunities along value chains.

<http://gldc.cgiar.org>

About the CGIAR

CGIAR is a global research partnership for a food-secure future. CGIAR science is dedicated to reducing poverty, enhancing food and nutrition security, and improving natural resources and ecosystem services. Fifteen CGIAR Centers in close collaboration with hundreds of partners, including national and regional research institutes, civil society organizations, academia, development organizations, and the private sector carry out its research.

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Alliance

