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Alliance



**Improving food security, nutrition, incomes,  
natural resource base, and gender equity for better  
livelihoods of smallholders in sub-Saharan Africa  
Seven Years of Impact: 2015–2021**

**Summary Report submitted to SDC  
October 2022**



The **Pan-Africa Bean Research Alliance (PABRA)** is a consortium of three regional bean networks:

The Eastern and Central Africa Bean Research Network (ECABREN), Southern African Bean Research Network (SABRN), and Western and Central Africa Bean Research Network (WECABREN), consisting of national agricultural research systems from 31 countries in sub-Saharan Africa, bean value chain actors from the public and private sectors, and the Alliance of Bioversity International and CIAT. PABRA is supported by a dedicated group of International development partners.

PABRA's focus is to improve bean productivity, use, and commercialization for the benefit of smallholder farmers and urban populations. Our goal is to enhance food and nutrition security, and income generation of poor communities in a gender-equitable and environmentally friendly manner.

[www.pabra-africa.org](http://www.pabra-africa.org)

PABRA is facilitated by the **Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT)**. The Alliance delivers research-based solutions that harness agricultural biodiversity and sustainably transform food systems to improve people's lives. Alliance solutions address the global crises of malnutrition, climate change, biodiversity loss, and environmental degradation.

With novel partnerships, the Alliance generates evidence and mainstreams innovations to transform food systems and landscapes so that they sustain the planet, drive prosperity, and nourish people in a climate crisis.

The Alliance is part of **CGIAR**, a global research partnership for a food-secure future.

<https://alliancebioversityciat.org>

[www.cgiar.org](http://www.cgiar.org)



# Acronyms and abbreviations

<b>ACIAR</b>	Australian Centre for International Agricultural Research
<b>Alliance</b>	Alliance of Bioversity International & the International Center for Tropical Agriculture
<b>BMGF</b>	Bill & Melinda Gates Foundation
<b>CBI</b>	Crop Breeding Institute
<b>CIAT</b>	International Center for Tropical Agriculture
<b>CIS</b>	Climate Information Services
<b>DR&amp;SS</b>	Department of Research and Specialist Services
<b>ECABREN</b>	Eastern and Central Africa Bean Research Network
<b>EIAR</b>	Ethiopian Institute of Agricultural Research
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FOMI</b>	Fertilisants Organo-Mineral Industry
<b>GAC</b>	Global Affairs Canada
<b>GAIN</b>	Global Alliance for Improved Nutrition
<b>HIB</b>	High-iron beans
<b>IFDC</b>	International Fertilizer Development Center
<b>ISABU</b>	Institut des Sciences Agronomiques du Burundi
<b>LFSP</b>	Livelihoods and Food Security Programme
<b>MDDS</b>	Minimum Dietary Diversity Score
<b>NARES</b>	National agricultural research and extension systems
<b>NGOs</b>	Non-government organizations
<b>PABRA</b>	Pan-Africa Bean Research Alliance
<b>QDS</b>	Quality declared seed
<b>SDC</b>	Swiss Agency for Development and Cooperation
<b>SMEs</b>	Small and medium enterprises
<b>TAAT</b>	Technologies for African Agricultural Transformation
<b>TARI</b>	Tanzania Agricultural Research Institute
<b>UNDP</b>	United Nations Development Programme
<b>USAID</b>	United States Agency for International Development

## Contents

- 4 Acronyms and abbreviations**
- 7 Introduction: The Pan-Africa Bean Research Alliance**
- 9 Burundi flagship**
  - 9 Context
  - 10 PABRA innovations for bean sector transformation in Burundi
  - 13 Lessons learned from Burundi
- 15 Zimbabwe flagship**
  - 15 Context
  - 15 Tapping opportunities for more resilient bean-based food systems in Zimbabwe
  - 19 Lessons learned from Zimbabwe
- 21 Taking better beans across Africa**
- 21 Reaching women and children**
- 21 Overcoming challenges together**
- 23 Staying ahead of threats for a more resilient future**
- 24 Some lessons learned and PABRA's future**
- 26 Acknowledgments**

## Figures

- 11 Figure 1:** Burundi bean corridor
- 11 Figure 2:** Burundi seed production
- 16 Figure 3:** Zimbabwe bean corridor



*“Improving food security, nutrition, incomes, natural resource base, and gender equity for better livelihoods of smallholder households in sub-Saharan Africa”.*

# Introduction

## The Pan-Africa Bean Research Alliance

For the past 25 years, the Pan-Africa Bean Research Alliance ([PABRA-Africa](#)) has been a great example of a successful public-private partnership that brings together CGIAR, NARES (national agricultural research and extension systems), and bean value chain actors from 31 countries in sub-Saharan Africa. This partnership model has resulted in great impacts on the livelihoods of millions of households in Africa. PABRA has evolved from a crop improvement network to an investment platform generating multiple benefits along the value chain. PABRA's strength lies in the strategic public-private partnership that provides the institutional, infrastructural, and technological innovations needed to boost the bean subsector.

Through a demand-led breeding approach, PABRA has developed and promoted more than 659 marketable, nutritious, resilient, and high-yielding bean varieties across the 31 member

countries in these 25 years. Promising breeding lines or new bean varieties developed in one country are shared across countries with similar agro-ecologies. In doing so, countries that lack capacity to undertake their own breeding programs still benefit from the improved germplasm shared from other countries. Using the partnership and regional network research approaches, PABRA has facilitated and empowered the National Agriculture Research and Extension Services (NARES members to conduct demand-led research and catalyze partner development organizations but also include market actors to invest in bean value chains. This approach has achieved multiple benefits at scale, including access to improved varieties, increased income and entrepreneurial development of women, improved nutrition and health for household diets, especially of children and women, and improved environmental health.

### **The PABRA partnership model was used to implement the SDC-supported Flagship initiatives in both Burundi and Zimbabwe with impactful results**

The Eastern and Southern Africa (ESA) Division of SDC has supported PABRA in its 25 years over various project phases with core contributions to PABRA covering 21 countries of the two networks, Eastern and Central Africa Bean Research Network (ECABREN) and Southern Africa Bean Research Network (SABRN<sup>1</sup>). The last phase covered from 2015 to 2021, when the ESA Division supported PABRA to implement the **“Improving food security, nutrition, incomes, natural resource base, and gender equity for better livelihoods of smallholder households in sub-Saharan Africa”** project worth US\$13.7 million. This project applied the PABRA model with a special focus on Burundi and Zimbabwe.

<sup>1</sup> ECABREN countries are Burundi, DR Congo (East & West), Ethiopia, Kenya, Madagascar, Rwanda, Tanzania, South Sudan, Sudan, and Uganda. SABRN countries are Angola, Botswana, DR Congo (South), Eswatini, Lesotho, Malawi, Mauritius, Mozambique, South Africa, Tanzania (South), Zambia, and Zimbabwe.



*The percentage of women in leadership positions in producers' organizations has increased to 52% across 11 provinces in 2021 from 35% before 2015.*



# Burundi flagship

## Context

Burundi is a small landlocked country in Central East Africa and the second most densely populated country in Africa (463 people/km<sup>2</sup> in 2022). The country's population has been expanding faster than its agricultural outputs and is expected to double by 2030 and triple by 2050, with almost half of the population under 15 years of age. Burundi has gone through more than a decade of civil war (1993–2005) with severe socioeconomic effects on the population. The country's economy depends on agriculture, which contributes about 40% of GDP and more than 95% of the food supply. High pressure on land is a leading cause of soil fertility depletion, eroding the country's capacity to ramp up its food production for the growing population.

Food and nutrition insecurity are alarmingly high. Despite progress made, malnutrition is still high. Five percent of children under the age of five are acutely malnourished or wasted and 56% are stunted ([USAID Burundi nutrition profile, 2021](#)).

The SDC-supported Flagship project sought to boost bean production and yield as a staple food crop. Beans provide 50% of daily protein and 20% of calories. Improved bean varieties with high levels of iron and zinc also alleviate micronutrient deficiencies, particularly in children and women. Beans cushion farmers from climate change threats occasioned by unpredictable seasons by staggering the food supply with edible leaves and pods that provide food in lean seasons.





## **PABRA innovations for bean sector transformation in Burundi**

### **Making better beans available**

Through PABRA, the Institut des Sciences Agronomiques du Burundi (ISABU) has released 30 climate-smart, farmer- and consumer-demanded bean (including climbing) varieties through demand-led approaches. Combined with improved crop management, farmers are harvesting 26% more from the same size of land than they would with local landraces, making extra income available for households. An impact assessment study conducted in 2019 showed that improved varieties are 15.8% more profitable than the local variety. It was also found that more than 95% of the harvested quantity is used for home consumption irrespective of the variety grown. The adoption of drought-tolerant medium-altitude climbers expanded the area grown to beans from seven agro-ecological regions in 2015 to ten in 2021. From 2015 to 2021, four bean (yellow, sugar, red, and red mottled) corridors have been established based on consumption and production zones, thus increasing bean consumption at the household level and expanding market opportunities for smallholder farmers in the country. Old varieties were replaced by new varieties at scale (see [Participatory Approaches and Demand-led Research making Bean Seed Accessible to Millions of Smallholders in Burundi \(pabra-africa.org\)](#)). The higher demand for improved seed resulted in an increased number of small and medium seed enterprises from 15 producing 10 tons of certified and quality declared seed (QDS) in 2014 to 315 (175 of them women-led) producing 1,595 tons in

2021. The yield gain resulting from the adoption of improved varieties and crop management practices in Burundi raised national bean production by more than 87,000 tons, enough to feed almost two million people per year if most people in the region eat on average 45 kilograms of beans per year. Considering the expansion of area under beans as well, annual national bean production increased from 250,000 tons in 2014 to 420,000 tons in 2021 (ISTEEBU, 2021).

### **Knowledge is power**

The number of people accessing information through training, PABRA websites, printed materials, demos, and mass media grew from 3,081 in 2015 to 29,662 in 2021 because of good partnership with several stakeholders. Specific focus was placed on greater women's participation in farmer field schools (FFS), demo plots, and farmer field days. Strong collaboration with public, private, and NGO partners such as World Vision International, International Fertilizer Development Center (IFDC), PRODEFI, Caritas Burundi, Catholic Relief Services (CRS), La Confédération des Associations des Producteurs Agricoles pour le Développement (CAPAD), Appui au Développement Intégral et à la Solidarité sur les Collines (ADISCO), Foundation Stamm, ENABEL, Food for the Hungry, and Tubura (One-Acre Fund) facilitated improved knowledge about new bean varieties and variety dissemination across the country, supported by improved communication through media and agricultural fairs. During the seven years, a total of 115,417 (53% women) people accessed information through training sessions, printed materials, and demonstrations, and more than one million through agricultural radio programs developed by ISABU Bean Program and development partners.

## Boosting trade

The demand for and trade in grain and seed of improved varieties increased across the bean corridors (Figure 1) as a result of enhanced partnership with value chain actors (individual farmers and cooperatives, associations producing highly marketable varieties, and seed producers responding to farmers' needs). The volume of improved dry bean varieties traded increased from 56,596 tons to 306,727 tons from 2015 to 2021. In 2015, only 20% of the beans sold in local markets were of improved type; this increased to 50% in 2021. This was possible due to the increased capacity of seed entrepreneurs multiplying various

categories of bean seed from basic to certified seed and QDS (Figure 2). Commercialization at the retail level was mainly done by women, having a direct impact on women economic empowerment equality. In 2015, the project started with one bean processor and by 2021 a total of eight small and medium enterprises (SMEs) were processing bean composite flour in Bujumbura, Kayanza, Ngozi, and Kirundo provinces. Demand is high for bean-based products at local markets primarily driven by the introduction of these products for feeding children at community crèches (see [Women in Burundi supported to save time and improve children's nutrition | \(pabra-africa.org\)](#)).

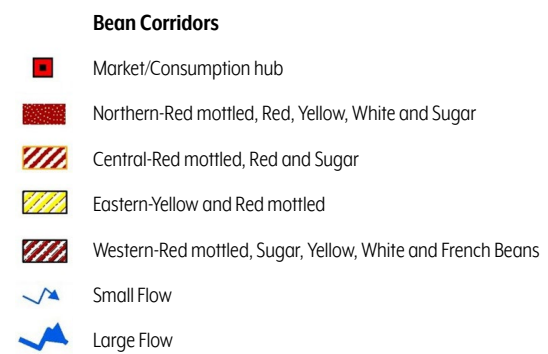
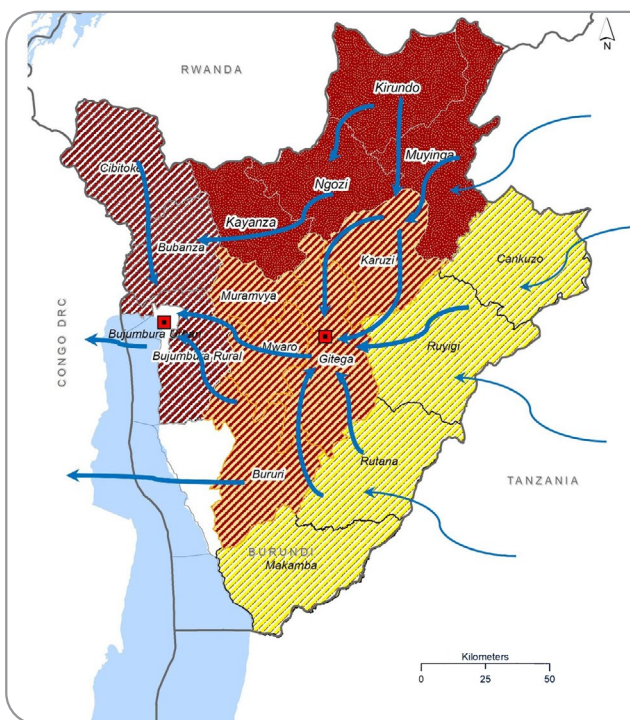
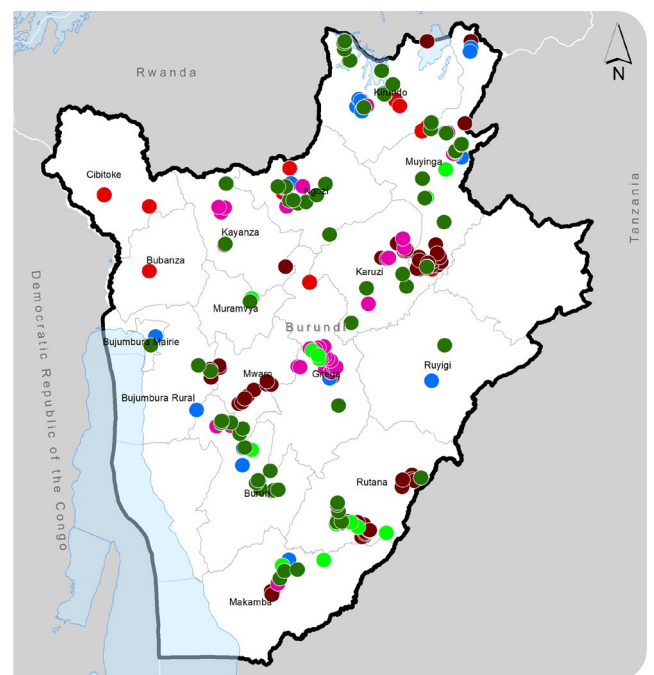


Figure 1: Burundi bean corridor

### Seed Location 2015-2021



Figure 2: Burundi seed production



## Building higher-yielding and stress-tolerant food systems

During the seven years of the project, ISABU Bean Program has released 30 preferred high-yielding and stress-tolerant dry bean varieties, contributing to varietal diversity in terms of tolerance of climatic stresses such as increased drought or flooding. Breeding efforts also addressed land scarcity issues, with climbing beans and bush bean varieties yielding more harvest in less space, in addition to adaptation to soil-related constraints and diseases such as root rots. In addition, among these released varieties, eight are high-iron beans (HIB), containing higher levels of iron and zinc. These varieties will contribute to improved nutrition and health.



### CASE STUDY

## Innovative models for increasing sales of quality seed through small package sizes

This innovation targeted smallholder farmers who could not afford large seed packs to access improved bean seed varieties. The innovation has been promoted in partnership with various stakeholders such as World Vision International-Burundi, IFDC, and ONCCS. This approach was introduced by ISABU as a scaling lesson from other PABRA member countries. The number of seed entrepreneurs selling small packs increased from one in 2018 to six in 2021, selling 5% of total bean seed (1,596 tons). They contributed to increased seed access among farmers with varied purchasing power. This innovation has empowered seed entrepreneurs to enhance bean seed production and delivery.

## Cross-country learning and capacity building

Before 2015, HIB varieties used in Burundi were developed in Rwanda by the Rwanda Agriculture and Animal Resources Development Board (RAB) in partnership with the CIAT (now the Alliance)

breeding team through ECABREN/PABRA. With cross-learning between institutes, breeding capacity within ISABU has been enhanced to evaluate and select HIB lines shared by the Alliance. One agronomist-climate action scientist was trained to the PhD level. Another is currently undertaking his PhD in bean breeding.

## Beans for women's and youth's empowerment

Across PABRA's work, there has been a deliberate effort to engage and empower women, men, and youth under 35. For instance, 55% of 315 local seed entrepreneurs are women ([Empowering women entrepreneurs to deliver quality bean seed in Burundi | PABRA \(pabra-africa.org\)](#)). The percentage of women in leadership positions in producers' organizations has increased to 52% across 11 provinces in 2021 from 35% before 2015. From the total of 115,417 people who were trained, 46,167 (40%) were women. Among the eight processors, 50% are owned by women and youth. Follow-up surveys showed that 65% of the targeted women and youth used the new technical knowledge, skills, and abilities they acquired, and more than 88% of the women reported that they felt empowered by their participation in the program. The Flagship facilitated the development of women entrepreneurs in various segments of the value chain, including farming as business, seed enterprise development (55% of seed entrepreneurs), and value addition (two of eight).

## Increasing the Minimum Dietary Diversity Score (MDDS) in mothers and children

In Burundi, the MDDS for women of reproductive age increased by 4.6% among families that adopted improved varieties, highlighting their impact on community nutrition. During the seven years of the project, ten training sessions for partner organizations were organized. The impact assessment shows an associated increase in dietary diversity scores. Nutrition education diminished the probability of falling sick by 17%. The project also promoted bean-based processed products for nutrition. In Burundi, the number of households consuming bean-based processed products made by local entrepreneurs in the intervention areas grew from 15,271 in 2015 to 252,126 in 2021.

## Sustainability of bean research and country ownership

In 2017, PABRA developed the Bean Corridor Approach ([PABRA20\\_Bean\\_Corridors\\_BRIEF.pdf; cgjar.org](#)) to respond to the increasing demand for climate-smart, farmer- and consumer-preferred varieties. This approach focuses on intensifying bean production to respond to marketing and

consumption needs by addressing and eliminating bottlenecks at key stages of the bean value chain, so that improved beans and products are accessed and used. Investments in the corridor are aligned and focused on enhancing efficiency of the three interlinked "hubs": **production, distribution, and consumption**. The Corridor Approach aligned PABRA interventions with the participation of the private sector in both country and regional networks through steering committees. The use of bean business platforms provided a framework that was key in bringing in the private sector to participate more in bean program activities.

With beans nicknamed the "sovereignty crop" in Burundi, the Ministry of Environment, Agriculture and Livestock in Burundi prioritized beans. The use of HIB has been institutionalized in government policies and practices. The impactful bean research attracted government support that contributed to increased public investments in the bean value chain. During a stakeholder forum in March 2022, Dr. Alfred Niyokwishimira, the Director General of ISABU said, ***"As a result of this highly impactful bean research partnership, ISABU has expanded demand-led research to other commodities starting with maize and potato."***

### Lessons learned from Burundi

- ✓ **Leveraging partnerships for wider impact:** Bringing together multiple stakeholders in Burundi from ISABU, farmers, the private sector, NGOs, and Alliance researchers led to strong collaboration and project implementation. The initial challenge was to make changes within a short time, but collaboration has led to longer-term impact.
- ✓ **Effective communication and engagement:** Effective communication and constant engagement between the ISABU bean team and the PABRA team have cascaded to national/local partners, including smallholder farmers/other value chain actors, and fostered ownership of results for long-term sustainability.
- ✓ **Strengthening digital solutions:** Network members were able to quickly pivot to find digital and virtual solutions when the COVID-19 pandemic hit. Despite restrictions, most field activities were implemented. The need to build and strengthen digital solutions is a key lesson to take forward.

A woman wearing a red beanie and a purple ribbed sweater is bent over, working in a field of green bean plants. She has a blue face mask hanging from her ear. The background is a blurred green field. A white circular line frames the woman and the text. A dark red circular shape overlaps the bottom left of the image, containing the text.

*At the farm level, more households started growing improved bean varieties, jumping from only 9% in 2015 to 47% in 2020.*

# Zimbabwe flagship

## Context

Zimbabwe is a landlocked country in Southern Africa with an estimated population of 15 million as of 2021. The country has two categories of farmers:

- ✓ **7.1 million smallholder and communal farmers occupying a total of 21 million hectares (58.7% of the arable land).**
- ✓ **9,655 large-scale commercial farmers with average land size of 148 hectares, constituting 4% of the arable land.**

Agriculture is an important part of the economy: employing 60–70% of the population, supplying 60% of raw materials to the industrial sector, and contributing 40% to export earnings and 17% to GDP. The country has experienced economic stagnation since the 2000s due to land reform and subsequent political and economic challenges. In Zimbabwe, 650,000 (27%) children under age five suffer from chronic malnutrition (stunting or low height-for-age) and 35% of women 15–49 years old are overweight or obese ([USAID, Zimbabwe Nutrition Profile, 2018](#)).

## Tapping opportunities for more resilient bean-based food systems in Zimbabwe

In Zimbabwe, the project aimed to (i) increase access to high-yielding dry bean cultivars and production information and technologies; (ii) increase access to micronutrient-rich bean products among vulnerable groups; (iii) increase access to profitable local and national markets; (iv) increase access to skills, information, and knowledge providing an enabling environment for bean research and development; and (v) increase capacity building of bean value chain actors.

## Taking improved beans to farmers and women

At the farm level, more households started growing improved bean varieties, jumping from only 9% in 2015 to 47% in 2020. Farmers growing HIB varieties also increased. For instance, the number of farming households that accessed seed of HIB varieties (mainly NUA 45) increased from 8,000 in 2015 to 193,050 in 2021. Similarly, those consuming bean-based products increased from 15,000 in 2015 to 528,000 in 2021. This had a knock-on impact on food consumption: the number of households in Zimbabwe with poor food consumption declined to 8.7% from a baseline of 12% in 2016, with an average increase of 16.1 points in the food consumption score index among families relying on rainfed farming in the intervention areas.



## Building a commercial appetite for beans

The project established bean corridors (Figure 3) based on areas where bean production is intensified, linking them with areas where beans are consumed and in targeted markets or distribution hubs. Thirteen business platforms were established, bringing together farmers, buyers, lead firms, and service providers supported by policy, extension, and research staff. Information and communication technology tools were used to link farmers to traders.

This network and private-sector engagement enabled the production of four bean-based products: bean flour, HIB bean grain, canned HIB,

and orange maize-bean *samp*. The number of farmer-and consumer-preferred bean varieties bred and released with improved traits such as drought tolerance or canning quality increased from four to ten. The engagement of seed companies to multiply and market certified seed resulted in increased volumes of bean seed in the market, from 520 tons in 2015 to almost 9,000 tons cumulatively over the project period. Private- and public-sector partners together promoted improved bean cultivars and complementary technologies, supplying an average of 1,285 tons of seed to 104,956 households per annum. The percentage of women employed in seed companies and aggregator businesses grew 28%, from 10% in 2014 to 38% in 2021.

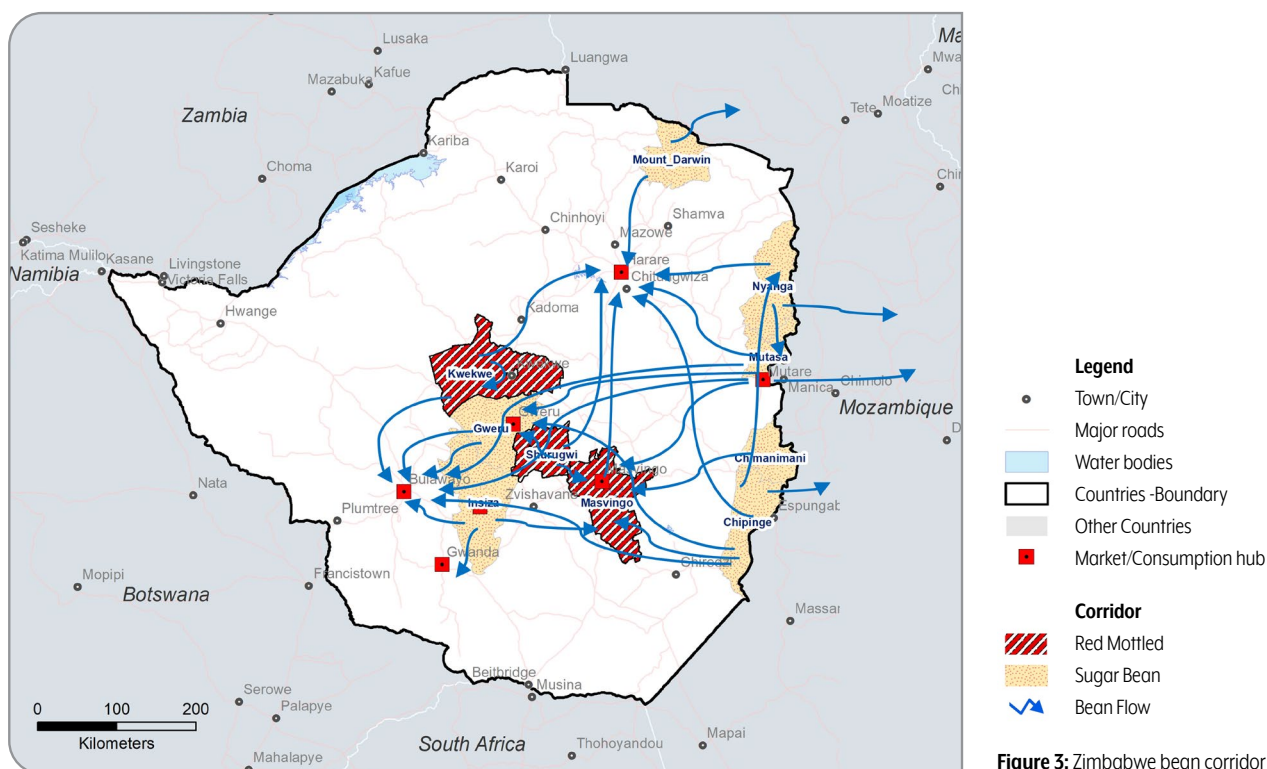


Figure 3: Zimbabwe bean corridor

## Enterprise development and tapping diverse products for new markets

Bean flour is an example of a product that was evaluated among consumers and partners before being promoted widely among communities. To expand their business, PABRA supported partners' participation in the National Trade Fair, the Harare Agricultural Show, and Zimbabwe Traditional and Organic Food Festival. The bean program also supported Healthy Foods, a women-owned private agro-processing firm, to develop flour and porridge, and to brand NUA 45 dry bean packs. The firm was linked to farmers to buy their grains and together they developed an innovation platform for consistent supply of NUA 45. This support has helped Healthy Foods Ltd. become a fully functional nutritious flour processor, supplying their products to 19 supermarket outlets across the country.



## **Innovative technology and information for bumper harvests**

Fifteen improved crop management technologies were prioritized to support farmers in boosting their yields alongside improved bean varieties. These include appropriate bean cropping systems, seed protection, water conservation and management, and postharvest management. Many of these existed in Zimbabwe but they were used on other crops, so the project adapted them to common bean. Gender-responsive business platforms have resulted in women and youth accessing extension services, seed, and skills in value addition. As a result, bean yield among trained women farmers in irrigated fields doubled from 850 kg/ha in 2019

to 1,800 kg/ha in 2021 and some seed companies (e.g., Zimbabwe SS) are indicating that farmers are obtaining bean seed yield above 2 t/ha in the dry season. Productivity under rainfed conditions also increased, however, varying by regions, and farmers managed to achieve 0.70–0.87 t/ha in 2021.

Women are motivated and willing to produce more beans than youth. The number of youth is still growing and they have other things to do, such as gold panning. About 110,000 and 70,000 women and youth have accessed labor-saving technologies, respectively. Some of the women and youth have gained business skills and now add value to beans and sell at 50% higher prices than those of grain.

## S U C C E S S S T O R Y

### **Tapping into beans to grow back stronger**

In 2016, Mr. Mudimu lost his job in the city and moved to his rural home in Manicaland Province of Zimbabwe. Mr. Mudimu grew beans but, because of high prices charged by middlemen, he could not make ends meet from the sale of his beans. “My small savings were gone; returns from bean sales were not sufficient. My children were happy that I was home, but where was I going to get the school fees? It was clear that some of them were going to drop out of school; I had no choice.”

Mr. Mudimu attended a training course in 2018, organized by the Crop Breeding Institute (CBI) working together with the local extension office on bean seed production. He was able to access quality seed and at first planted 0.2 hectare of NUA 45. He produced 200 kg of beans, which he sold at US\$3 per kilogram, gaining an income of US\$600. That same year, he expanded his crop area to include other bean varieties. Now, Mr. Mudimu's children have returned to school. He has since bought a cow and renovated the family house from income generated from selling beans.

Mr. Mudimu's family is among the farmers producing breeders' seed for CBI at Manunure Innovation Platform. The partnership started in 2018 with 24 farmers, who rose to 81 farmers in 2019 and 152 farmers, including youth, in 2021. CBI has a reliable source of breeder seed from Manunure farmers. In 2021, participating farmers generated about US\$12,380.



### **Targeting the most vulnerable with nutritious food**

The project aimed at increasing bean consumption to decrease deficiencies in protein and micronutrients such as iron and zinc, thus lowering the risk of childhood stunting and chronic diseases such as anaemia, diabetes, and heart diseases.

During the initial phase of the project, households were hesitant to accept HIB due to their red and mottled color; they preferred the sugar types.

However, with consistent promotion and awareness among the coalition of partners, their confidence encouraged farmers' adoption of new varieties.

Training in processing bean-based products took place through on-farm demonstrations and field days, and cooking demonstrations and agricultural shows and food and seed fairs raised awareness. A bean-based recipe book was developed and shared with HarvestPlus, which developed a flyer on HIB in collaboration with the Ministry of Health under the Livelihoods and Food Security Programme.

Since the start of the project, HIB have been integrated into government policy and into the national biofortification program, resulting in increased uptake and production of HIB varieties by farmers and schools. High-iron bean varieties are currently recognized in the smallholder government input policy support program. Since 2015, the project has integrated a school feeding approach

by improving school meals with HIB for primary school kids and training school children on the nutritive value and the different ways of preparing bean-based products. In addition, the project used the food basket approach to diversify consumer diets, educate communities during field days on the nutritive value of different beans, and how to prepare nutritious meals from different bean products, and establish Keyhole Gardens and Health Care Groups.

### **Making better, nutritious beans more available**

Zimbabwe has used the commodity corridor and innovation platforms to boost bean production and marketable volumes and decrease bean imports. Six new bean varieties have been released, including Sweet William, a sugar bean type, attracting high national demand. Its traits are drought tolerance, high grain yield potential, and tolerance of diseases of economic importance. Farmers located in dry areas who did not grow beans before are venturing fully into bean farming, thus increasing national production volumes. For instance, Protea and Canpsula were developed and released not only for their high yield potential and tolerance of diseases such as rust, common bacterial blight, and angular leafspot, but also for canning baked bean properties. The HIB varieties have reached about 185,000 more households since 2015, rising from 8,000 to more

than 193,000 households in 2021. The mandatory food fortification policy has resulted in increased demand for biofortified crops such as beans and pro-vitamin A maize. Processors such as Cairns Foods Limited and Healthy Foods have commercialized HIB variety NUA 45. The number of consumers accessing processed HIB-based products rose from 3,000 in 2015 to 150,000 by 2021. These numbers continued to rise because of the increased government emphasis on nutrition-sensitive agricultural value chains.

### **Building and supporting local capacity**

Zimbabwe mainstreamed the production of HIB varieties (NUA 674, Protea, and Camellia), which have canning quality. Instead of focusing solely on variety development and release, the national program was supported and equipped through PABRA to address the entire bean value chain, from breeding, agronomy, nutrition, markets, equity, and gender to seed systems, resulting in increased adoption of improved cultivars. The project built on the existing institutional collaboration in the PABRA framework such as the availability of promising or proven technologies and scientific approaches to move fast and efficiently. The availability and wider deployment of farmer- and consumer-demanded varieties encouraged farmers to conduct soil fertility tests, identify pest problems, and develop better management options.

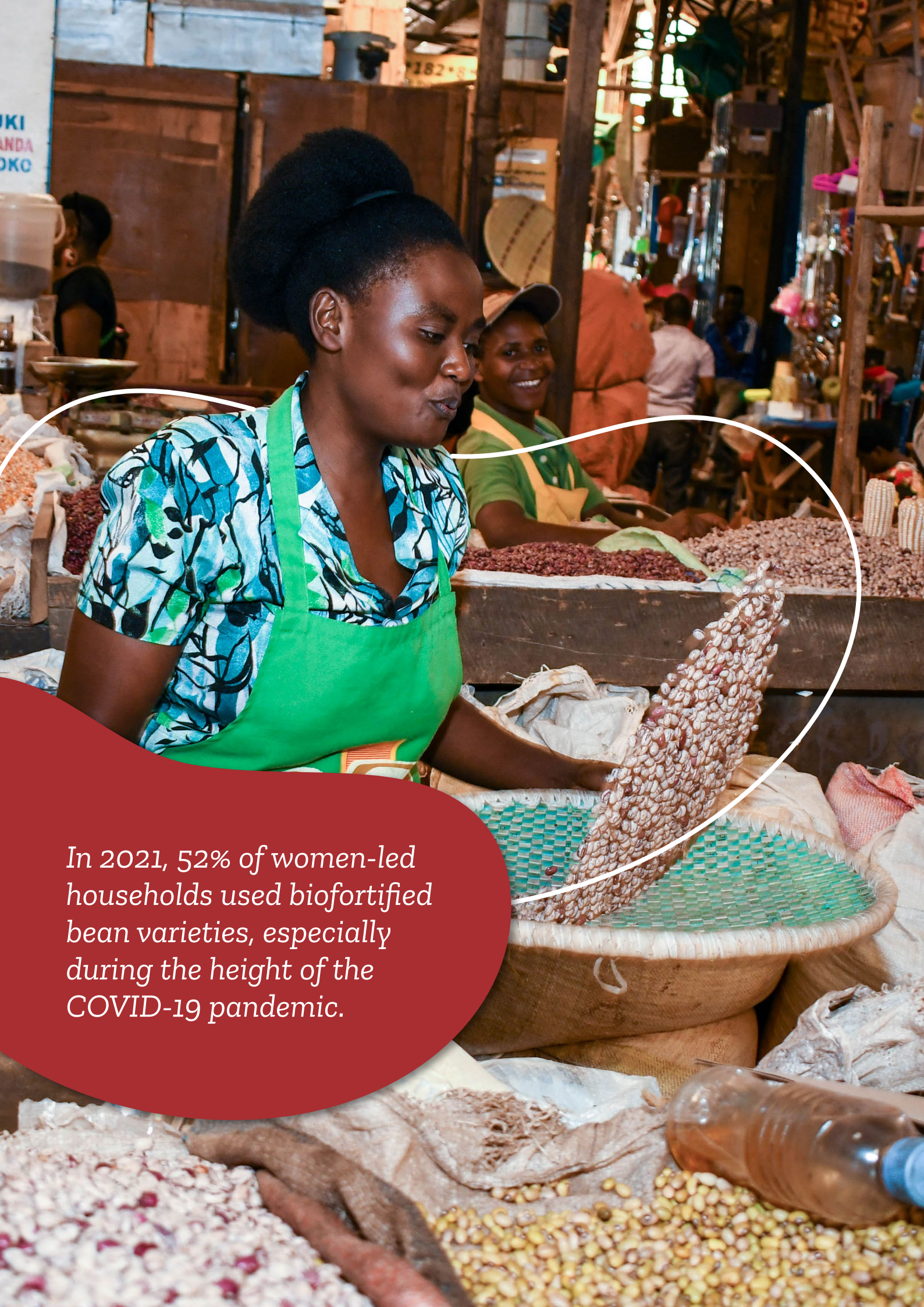
### **Beans for women and youth empowerment**

In Zimbabwe, recent surveys show that men's, women's, and youth's participation in agronomic training provided by extension workers, DR&SS, CADS, LEADS, and Feed the Future increased and as a result benefited women by 46% compared with 37% of men and 17% of young people. Women's participation in research and decision-making bodies of PABRA and in bean platforms doubled to more than 50%, and the percentage of women employed in seed companies and aggregator businesses grew from 10% in 2014 to 38% in 2021. Because of increased demand for biofortified beans in Zimbabwe, many entrepreneurs are now into the marketing of branded grain packs of NUA 45; for example, a young entrepreneur of Sky Brands started marketing branded NUA 45 grain packs in 2017.

## **Lessons learned from Zimbabwe**

- ✓ **Strengthening institutional capacity:** Building upon existing institutional collaboration in the PABRA framework and partnership continues to be a strong model for scaling up proven innovations, technologies, and approaches. Continuous interactions among members and building of skills and knowledge are key to delivering impact at scale and demand-led research results. Continuous investment in capacity building among farmers and mentoring of individual and group-based women and men entrepreneurs is critical to encourage growth among bean producers and entrepreneurs, especially among youth and women.
- ✓ **Improved research through demand-led approaches:** The availability of farmer- and consumer-demanded varieties coupled with improved soil fertility and pest management were anchored on farmers' active participation. Their active communication and engagement with information and knowledge in different formats, from publications, facts sheets, variety catalogues, posters, and radio and television to emails, WhatsApp, field days, and agricultural shows, have been critical to incorporate feedback and develop new varieties.
- ✓ **Market-systems approach:** Linking farmers with markets has been key for boosting yield and enabling farmers to earn more and higher income. The alignment of bean research interventions with the private sector and other partners along the bean value chain is a key strength of the PABRA network.





*In 2021, 52% of women-led households used biofortified bean varieties, especially during the height of the COVID-19 pandemic.*

## Taking better beans across Africa

Across Burundi, Democratic Republic of Congo, Eswatini, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe, better beans are reaching millions more people. From 2015 to 2021, the project reached more than 24.2 million farming households with quality seed of climate-resilient, farmer- and consumer-demanded varieties in the above-mentioned 16 countries.

The increase is a result of improved partnership among the value chain actors, particularly traders and seed producers, adopting bean corridor and platform approaches, which bring actors together (researchers and seed producers) who supported farmers in accessing, promoting, and adopting new bean varieties, in the Democratic Republic of Congo, Eswatini, Ethiopia, Rwanda, Madagascar, Mozambique, and Zambia. In addition to collaborating with more partners and increased awareness campaigns, interest among the private sector, development partners, and governments has also increased. For example, in Burundi and Tanzania, the governments and NGOs stepped up efforts to promote school feeding using biofortified beans in the past two years ([Tanzania school feeding policy brief](#)). In 2021, 52% of women-led households used biofortified bean varieties, especially during the height of the COVID-19 pandemic. More than five million beneficiaries now consume bean products over the project lifetime.

## Reaching women and children

Across Africa, almost eight million more people (more than half women) accessed HIB varieties through PABRA's network. An additional four million consumers (65% women and children) accessed new nutritious bean-based products developed by PABRA-supported entrepreneurs in Burundi, Kenya, Madagascar, Rwanda, Uganda, Zambia, and Zimbabwe.

## Overcoming challenges together

The COVID-19 pandemic impacted the world negatively and affected physical interactions required for technical aspects of breeding, especially where training and workshops had been planned. While it was possible to continue on-station activities, labor was scarce, and some breeding activities were slowed down. PABRA members were quick to embrace online communication tools, allowing interaction to a great extent, which could not replace the power of physical interaction required for technician training or field monitoring. Great strides were made among country teams, who worked together and used the PABRA network to strengthen capacity despite pandemic-related setbacks. Adopting the Bean Corridor Approach strengthened this connection between production, distribution, and consumption hubs to diminish bottlenecks along the value chain.





## CASE STUDY

### **Improving nutrition for children in Tanzania through school feeding approach**

The school feeding approach has attracted countrywide investment by development partners to support new bean varieties in schools. In Tanzania, PABRA collaborated with partners (among them Plan International, Concern Worldwide, Save the Children, World Vision International, Caritas, ADP Mbozi, FAO and GAIN/HarvestPlus, Clinton Foundation, One Acre Fund) who are integrating biofortified bean varieties in nutrition programs to increase the number of schools preparing biofortified and more nutritious meals from 23 in 2018 to 492 in 2021, reaching 238,972 school children, half of them girls, by 2021. Initially, the seed was produced by Tanzania Agricultural Research Institute and ASA (parastatal), but now nine new seed companies are sustaining the seed supply, including newly released varieties.

***“The enrolment in our school has improved significantly since the start of the feeding program. Most of these children have been coming to school because of the food, and that is wonderful. I am glad the children are even happier to be in school,”*** said one of the teachers championing for beans in the school feeding program at a school in Moshi, Tanzania.

## Staying ahead of threats for a more resilient future

The Eastern and Southern Africa regions continue to experience the burden of climate change. Extreme droughts, a lot of rainfall/floods, depleted and/or unsuitable soils, and unreliable rainfall coupled with associated challenges posed by pests and diseases have affected bean production. It is imperative that PABRA continue testing and deploying climate adaptation measures to significantly accelerate the replacement of existing varieties with newer ones adapted to tomorrow's changing climates. These varieties will be supported by appropriate climate-smart agronomic practices.



ISABU bean breeding team making crosses to develop climate-resilient varieties using a greenhouse established with Flagship initiative support.

In the phase 2015–2021, a total of 157 new bean varieties, including multiple-stress-tolerant lines, were released in 17 out of 20 target countries. A total of 54 iron-rich varieties were also released. Botswana released a new tepary bean (*Phaseolus acutifolius*) variety, GK012, that is heat-tolerant compared with common bean. The bean production environments, especially for Southern Africa, are predicted to become hotter and drier in the future and the use of tepary bean and interspecific lines from tepary will help to ensure that bean production continues in such environments, because of their inherent traits for drought and heat tolerance. Increased rainfall has been predicted in East and Central Africa, implying an increase in disease pressure. The pre-emptive use of *P. coccineus* as a source of disease resistance by the bean breeding program in Colombia has resulted in new interspecific bean germplasm that is being deployed at various stages of evaluation

within countries across Africa. Burundi, for example, released four small red low-soil-fertility and root-rot-resistant *P. coccineus* interspecific lines in 2021.

In addition to climate-smart varieties, the project stepped up delivery of Climate Information Services by deploying training. By the end of 2021, the project had trained 1,032 experts and farmers (30% women) across seven countries with the goal of having experts and community champions to continue to deliver climate extension to producers. The project stepped up climate advisories, sharing from the national meteorological departments, using digital applications such as DACA, Accuweather, Yara Weather, and Kenya Agricultural Observatory Platform (KAOP), among others. Farmers have been able to use this information to make decisions about which bean varieties to grow for specific seasons, when to plant or spray, and when to harvest.

## Some lessons learned and PABRA's future

### **Harnessing the power of demand-led breeding for increased consumer focus and to enable emerging investments**

In the past decade, foresight on consumer preferences and market needs has become a central focus. The demand-led breeding approach will continue enabling PABRA to pay more attention to consumer-preferred traits such as size, color, and shape of the grain; reduction of cooking time; low flatulence; and palatability/taste. PABRA will broaden the variety testing system to include the emerging private-sector seed companies and medium- to large-scale farmers who are interested in growing high-value beans under optimal production conditions. This will allow the best bean genetics to flow to where they are needed while providing an avenue to greater access to selection data to make stronger advancement decisions.

### **Promoting sustainable bean production technologies**

The project developed promising bean production technologies, which need further scaling out to increase bean productivity at the farm level. Opportunities for private-sector linkages are critical for ensuring faster delivery of inputs, technologies, and practices. Through innovative approaches such as technology bundling, farmers' access to inputs and knowledge for bean production will be improved.

### **Scaling nutrition for rural and urban consumers**

Diets are changing, especially among urban populations, thus calling for more affordable, healthy, convenient, and easy-to-cook foods. This offers an opportunity for processing companies (particularly women-owned enterprises) to find newer ways of processing and packaging beans.

### **Targeting the most nutrition-vulnerable groups**

School feeding programs have attracted investment from the private sector and development partners to support technology dissemination. Scaling school feeding and nutritional education in schools could accelerate the uptake of biofortified beans.

### **Building resilience to climate change**

There is an opportunity to build effective partnerships with advanced laboratories to breed for more climate-resilient lines. At the same time, this will strengthen the provision of targeted Climate Information Services to inform decision-making on which varieties to select for a given growing season and its rainfall distribution, when to plant, and which bean production operations to adopt to mitigate against the adverse effects of climate change. Farmers accessing and using climate information could record stable yields compared with those not having access to such information.

### **Digital financial inclusion in agriculture**

The introduction of seamless transactions with non-cash payments is an avenue for cutting transaction costs for both buyers and sellers. It facilitates linkage to other financial intermediaries such as banks and microfinance institutions to empower bean enterprise development and stimulate vibrant bean-related value chains. Therefore, promotion of such technologies can enhance bean farmer profitability. The experiences from Uganda and Tanzania with the Mastercard Farmer Network can be further scaled to other countries. Women farmers have benefited from the introduction of digital financial platforms.



## ✔ Beans for women and youth economic empowerment

Women and youth are still constrained by lack of access to finance for farm operations, limited ownership of land, lack of mobility, low mechanization, and high workloads, particularly in some communities. Targeted interventions for economic empowerment of women and youth

would encompass enhancing access to the use and ownership of productive resources, capacity building in enterprise development, facilitating access to finance, and increasing the role of women and youth in leadership and decision-making. Emerging opportunities for women and youth groups include fostering enterprises on bean-based products and mechanization to provide agricultural services such as threshing.



A photograph of a man in a blue t-shirt sorting through large sacks of beans in a market. The background shows a street with colorful buildings and other people. A large red circular graphic is overlaid on the left side of the image, containing the text.

## Acknowledgements

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