

# FARM TO PLATE

***SCHOOL FEEDING CATALYSING INVESTMENTS IN  
HIGH IRON BEAN VALUE CHAIN IN TANZANIA***





## Authors

Kessy RadeGunda, Robert Fungo, Sylvia Kalemera, Josey Kamanda, Justin Machini, Mary Mdachi, Mary Ndimbo, Julius Mbiu, Shida Nestory, Rose Matiko Ubwe, Fadhili Salum Kasubiri, Patricia Onyango and Jean Claude Rubyogo

## Citation

Kessy RadeGunda, Robert Fungo, Sylvia Kalemera, Josey Kamanda, Justin Machini, Mary Mdachi, Julius Mbiu, Shida Nestory, Rose Matiko Ubwe, Fadhili Salum Kasubiri, Patricia Onyango and Jean Claude Rubyogo. (2021).

Farm to Plate: School Feeding catalysing investments in high iron bean value chain in Tanzania.  
*TANZANIA SCHOOL FEEDING POLICY BRIEF*

## Design and Layout

*Beyond Sites Solutions Ltd*

*For more information contact:*

### **Patricia Onyango**

*Communications,  
the Alliance of Bioversity International and CIAT  
ICIPE – International Centre of Insect Physiology  
and Ecology  
Duduville Campus Off Kasarani Road  
P.O. Box 823-00621  
Nairobi, Kenya  
[www.pabra-africa.org](http://www.pabra-africa.org)*



# Contents

6

*Introduction*

7

*Multi-stakeholder  
approach to reach  
community*

10

*Results*

17

*Conclusion*

18-19

*Acknowledgments  
References*



## **Key Messages**

- Greater collaboration between the local government, agriculture, education, health, and nutrition sectors is fundamental.
- Nutritional quality of school feeding, including biofortified High Iron Beans (HIBs) and related value-added products are improved
- Small-scale farm-based bean value chains in the communities and their owned schools are stimulated by introducing targeted measures, such as seed multiplication and distribution, post harvesting management, good nutrition and dietary practices that increase the demand for HIBs



*Pupils and teacher from Wangamiko Primary school in Wanging'ombe district cleaning JESCA grains after harvest*



*of Tanzanians are engaged in farming*

## 1. Introduction

Adequate nutrition is essential for schoolchildren's health and wellbeing. Most children who benefit from school feeding programmes could already be nutrient deficient, vulnerable or at risk. These children rely heavily on such programmes because these could either be the only meal they consume in the day.

At least 23 million (40%) of the Tanzania population suffers from hunger. The situation is particularly dire in rural and peri-urban areas, where over 80% of the population are undernourished. In addition, about 40 million (60% of the population) experience 'hidden hunger' where their diets lack sufficient essential vitamins and minerals for a healthy and productive life. Iron deficiency is one of the most common micronutrient deficiencies in Tanzania, affecting about 58% children (TDHS-MIS, 2015-16). Almost half (45%) of Tanzanian women of reproductive age (15-49 years) are anaemic. Malnutrition results in productivity losses (Alphonse, 2017) to individuals estimated at more than 10 percent of lifetime earnings, and Gross Domestic Product (GDP) losses as high as 2 to 3 percent. Reducing malnutrition is at the core of the Pan-Africa Bean Research Alliance (PABRA)'s mission to end poverty, food and nutrition insecurity in Africa.

Although an estimated 80% of Tanzanians are engaged in farming, they can barely afford a nutritious balanced diet, which has resulted in the

*"At least 23 million (40%) of the Tanzania population suffers from hunger"*

**40%**

high malnutrition rates in the country (Alphonse, 2017). In addition, contribution of food from parents to schools was disrupted by the declaration of free education to all children in 2015. This affected parents willingness to contribute beans for lunch during the school calendar. In some regions, parents stopped contributing funds towards the school food with the hope that the government will pay. Furthermore, it has been noted that some parents cannot afford to contribute the money needed towards the food kitty.

In response to the high prevalence rates of malnutrition, to maximize the impact of investments on negative nutrition outcomes for women and children, multi-sectoral interventions are proposed as long-term sustainable approaches to address malnutrition in Africa (Garrett et al., 2011). Anticipating the release of HIB varieties in 2018, by the Tanzania Agriculture Research Institute (TARI) in collaboration with PABRA, the two organizations co-developed an approach to promote use and consumption of high iron beans (HIBs) in schools and surrounding communities. The approach used a multi-stakeholder approach consisting of: Local Government Authorities (LGAs), schools, entrepreneurs (grain traders, food processors), inputs suppliers (seeds and agro inputs) and end users.

*"multi-sectoral interventions are proposed as long-term sustainable approaches to address malnutrition in Africa (Garrett et al., 2011)."*

## 2. Multi-stakeholder approach to reach community

### 2.1 Collaboration with schools

Collaboration with primary and secondary schools as an entry point to the community to address malnutrition using biofortified beans as an innovative approach started in 2017. Various stakeholders in the Northern Zone of Tanzania were sensitized on health and economic importance of biofortified beans. During the sensitization workshop, representatives drawn from five districts councils including district executive directors, district education officers, district medical officers, district nutrition officers, district agriculture and irrigation officers and district health officers were invited to planning workshop in Arusha. The objective of the workshop was to sensitize the district officials on using recently released HIBs to address malnutrition in the communities. At the end of workshop, work plans on how to mainstream the use of HIBs in each district targeting schools were drawn. Parents and the communities at large who supply food to the schools were involved, High iron Bean field demonstration in

the schools with support from district teams were also set up.

In 2017, a pilot phase was conducted in the Northern zone with five districts schools selected: Mbulu, Arumeru, Monduli, Hai and Moshi rural. Twenty-two primary schools (Figure 1) were identified and involved to establish demonstrations plots in their schools (Figure 2). Each school was given 10kg seed of JESCA variety which were planted in area of 0.25 acre serving for students' agricultural learning sites and demonstration for parents. **The 10kg of seed yielded at least 100kg of beans for each school.** Each school replanted 90kilos of harvested beans and the remaining 10kilos was shared with neighbouring schools that were not in the first cohort. For the second season, each of the twenty-two schools replanted 90kilos and harvested 900 kilos in total. Out of the 900Kilos of harvested beans during the second season, each school shared 100 kg to ten other schools as part of seed revolving process reaching 253 schools by 2020.



**The 10kg of seed yielded at least 100kg of beans for each school**

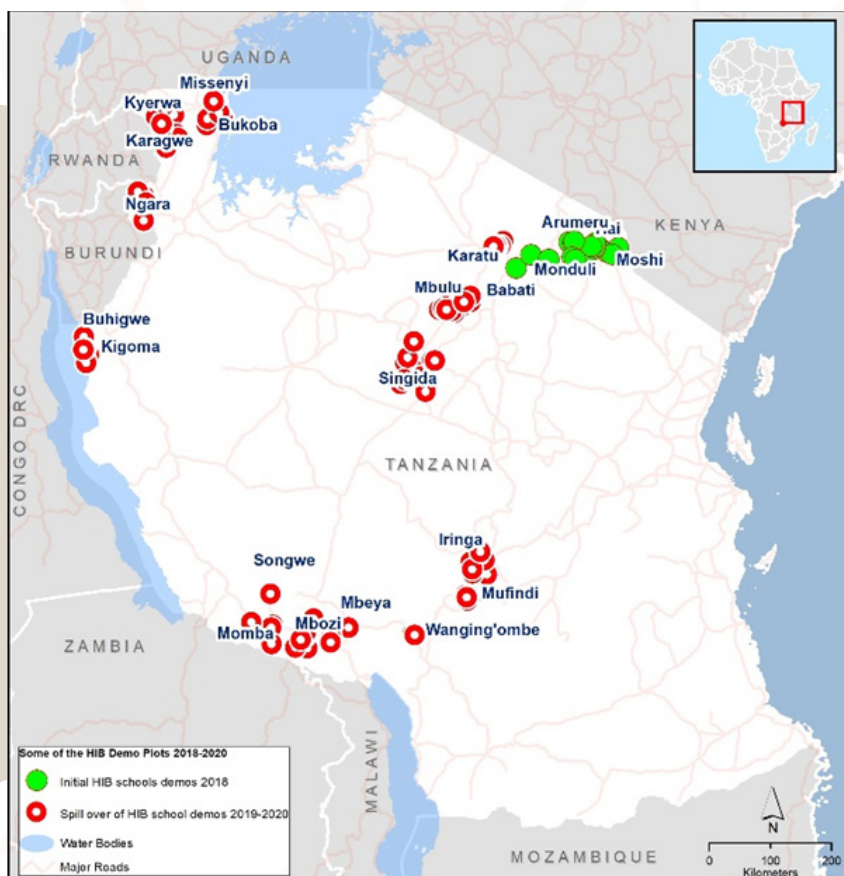


Figure 1: Map of Tanzania showing location of the HIB school feeding demo plots from 2018-2020



*Figure 2: Student learning about bean growing by planting HIB seed in schools*

**T**eachers in Agriculture were selected to as champions for the project. They were trained on good agronomic practices (GAP), seed production and post harvesting management. At maturity stage, farmer field days were organized with parents and the participating neighbouring communities. Nutrition education that included understanding the role of iron and zinc in human body, household dietary practices. Other discussions centred around benefits of high iron beans in the school feeding including increased cognitive performance (Murray-Kolb et al. 2017). Bean cooking demonstrations were organized and the community members tasted the beans. They were also taught on bean utilization. zWTowards the end of 2018, the innovative approach was picked up in the lake zone and Southern Highland of Tanzania in collaboration with TARI Maruku and TARI Uyole respectively. The research centres conducted sensitization meetings with district councils and various Non Government Organizations (NGOs) to including the approach

in the annual workplan. Thereafter the districts and NGOs identified at least five schools in each district to initiate the program.

To share on the results and benefits of the initiative to the schools and communities, TARI and PABRA teams conducted focus group discussions with representatives from the district councils, schools, NGOs and parents (school committees) from the three zones (northern, southern high land and lake zones) to discuss progress and outcome of linking high iron beans to school feeding programme. A checklist with guiding questions was used to capture the information during these discussion. Stakeholder meetings in Southern Highland and lake zone were also held to complement the information from partners. Also various reports produced during the implementation process were reviewed.



## “Launch of nine varieties of common beans, two of them biofortified, authorised by the Tanzania Seed Regulatory Authority (TOSCI)”

### 2.2 Release of improved bean varieties of HIB in 2018 and Government policy support

In 2018, TARI Selian in collaboration with the Alliance of Bioversity International & CIAT launched nine varieties of common beans, two of them were biofortified, authorised by the Tanzania Seed Regulatory Authority (TOSCI). Various stakeholders participated in the event among them; farmers, processors, seed companies, media, researchers, Agricultural Seed Agency (ASA), representatives from Ministry of Health, Policy makers, District Commissioners, NGOs (Agriculture Marketing Development Trust) and agro mechanization companies. The event was led by the former Minister of Agriculture Honourable Eng. Dr Charles

Tizeba (Figure 3). TARI Selian together with partners such as PANITA arranged several meetings with agriculture and irrigation parliament committee, -Promotion and advocacy campaign was organized with country coordinator to sensitize the members of the parliament in Dodoma about the High iron beans and the various products derived from the beans.

### 2.3 Engagement of the Ministry of Agriculture to support the scaling up

Reaffirming its commitment to address malnutrition, the Government of Tanzania has released National Biofortification guidelines. These guidelines disseminated by the Ministry of Agriculture are provide direction to stakeholders on managing biofortified crops value chain. The nationwide dissemination was unveiled in Sep 2020 in Dar es Salaam by former Vice President, Hon. Samia Suluhu Hassan after the launch during the annual Farmers' Exhibition in August. Promotion of HIB are ongoing through various channels to reach wider community. For example, During the World Food day commemoration 2019, the former regional commissioner of Singida directed Ikungi DC to immediately pilot the school feeding program using HIBs in 10 schools in 2020 and in 2021 Itigi DC joined the program with an additional 10 schools.

Figure 3: Former Minister for Agriculture Honourable Eng. Dr Charles Tizeba (in white t-shirt) leading the launch of the new varieties of beans



### 3. Results

#### 3.1 Increased adoption of HIB in schools

The field demonstrations have served as bridge to the surrounding communities, particularly parents and community/school-based institutions (school committees) who endorsed the approach. The pilot phase started with twenty two schools in 2018 in five districts, later expanding to 107 schools in 17 districts by end of Nov 2018, 259 schools in 19 districts in 2019 and 492 schools (238,972 children) in 23

districts by February 2021 (Figure 4). The success registered in the number of schools taking up the new varieties may be attributed to the successful linkage established among research insitutions among them TARI in collaboration with PABRA, local government agencies (LGAs) through districts and education insitutions. (Table 1 & Figure 5). Development partners were engaged through regular meetings, workshops, visits, trainings, exhibitions, media program, technical backstopping.

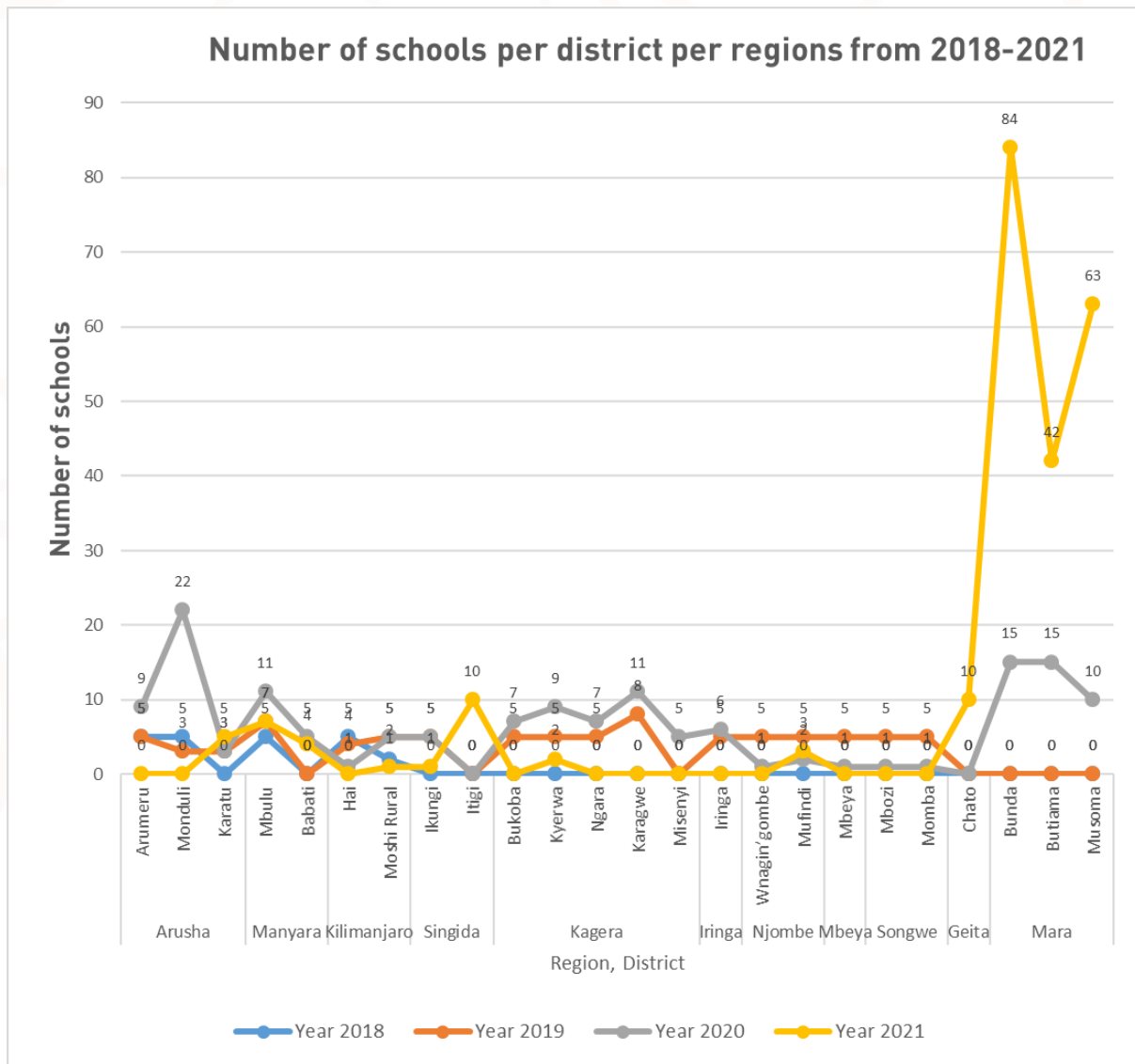
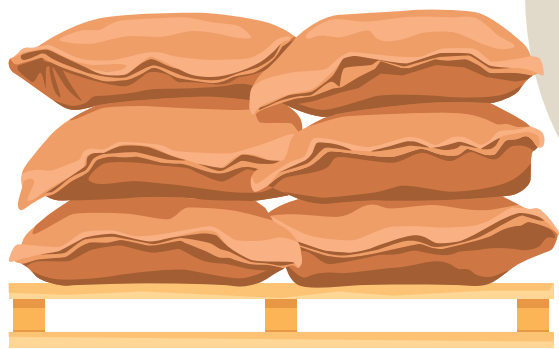


Figure 4: Distribution of schools per years and district

Table 1: Partners involved in the promotion of HIBs in Tanzania between 2017-2020

Before 2018	2018-2020	Area under operation
TARI Selian	TARI Maruku	Lake zone
ASA	TARI Uyole	Southern Highland
	World Vision International	Monduli and Karatu
	Save the Children	Dodoma and Iringa
	Lishe Endelevu	Morogoro
	RECODA	Karatu, Babati, Meru and Morogoro
	Youth Peace Makers	Lushoto
	NAFAKA - Africa RISING	Momba, Iringa, Kilolo, Mufindi, Mbozi, Wanging'ombe
	FLCAD	Kyerwa
	MAVUNO	Karagwe and Kyerwa
	FAO	Bukoba, Misenyi, Karagwe, Kyerwa, Muleba, Ngara
	CARITAS Mbeya	Mbeya
	ADP Mboziw	Mbozi, Katavi
	Project Concern International	Bunda, Musoma and Butiama
	LGAs (District councils)	Meru, Hai, Moshi, Moduli, Babati, Mbulu, Ikungi, Chato, Bukoba, Kyerwa, Karagwe, Ngara, Misenyi, Iringa, Mufindi, Wanging'ombe, Mbeya, Mbozi, Momba, Bunda, Musoma, Butiama.

Source: Focus group discussions and interaction with partners



Overall, over 4.8 tons of seed were distributed

# 4.8 tons

The rapid results have happened because of the the districts and development partners' active ownership and the support from researchers from TARI and PABRA who ensured that in every season at least five schools in each district, through a seed revolving process among the schools, the schools to receive seed packages produced by the other pilot schools. For example in the lake zone, five districts from Kagera region (Bukoba, Karagwe, Ngara, Kyerwa and Missenyi), a total of 64 schools were recruited. In Geita region one district of Chato had 10 schools participating in the programme and Central zone one district of Ikungi in Singida region, 11 schools participated in the programme. At the end of each season, each school distributed 10kilos of seed produced after harvest to neighbouring schools, to increase

the coverage of seed reaching the various schools. During the focus group discussions, schools listed the number of students and names of the schools receiving the seeds. Follow up meetings with schools that received the seeds from the intial schools, were conducted to document amount of grain produced and consumed and seed produced and shared with more neighbouring schools. The beans produced was consumed by the students, with schools in the districts of Moduli and Mbulu consuming over one ton of high iron beans produced by schools. Overall, over 4.8 tons of seed were distributed during the duration of implementation of the programme.

Figure 5: Participants at the stakeholder meeting in TARI Uyole in 2020



## Criteria used to distribute

**9.7 tons** of seed were distributed to community members around the participating schools in districts of Arumeru, Moduli, Karatu, Mbulu, Babati, Moshi Rural, Bukoba, Kyerwa, Ngara, Karagwe, Misenyi, Iringa, Wanging'ombe, Mufindi and Mbeya.

The criteria used to distribute the seed include;

- i) best performing school children and standard seven pupils about to transition from the school,
- ii) school committee members and other parents,
- iii) school teachers including retiring teachers,
- iv) some parents bought from school at a subsidised price between TSh 1,500 to 2,500 (approx. US \$1-2),
- v) some parents were given seed in kind for contributing labor in the school planting, for example ploughing the land or harvesting
- vi) other seeds were gifted to visitors coming to the schools,
- vii) extension officers who supported the school,
- viii) community leaders such as the councilors and
- ix) neighbours around the schools.

## 3.2 Consumption of high iron beans in schools and community

Despite production per school being below potential, in a seed revolving way, the schools shared seed they produced with other neighboring schools (Figure 6). The school harvests were divided in three categories; seed to be saved for the next season, seed to be given out to communities and schools and grain for school feeding. During the group discussions, it was revealed that about 13.33 tons of HIB were consumed in the schools during the last three years of the programme (Table 1). The beans were prepared and consumed in various instances;

- i) cooked for classes with national examinations (standard four and seven) during the examination period,
- ii) some schools prepared bean composite porridge for the children,
- iii) others mixed beans with the food contributed by parents
- iv) in yet some schools, if the amount of beans harvested was small, it was consumed by teachers,
- v) during the COVID 19 pandemic, teachers of Izuo Primary school in Mbeya relied on 240kilos of JESCA harvested from their field to feed their children from July to December. Field performance especially high yielding, color, early maturity and taste was also attractive to community members who were involved. Community members who received seed from schools reported their plans to expand production.

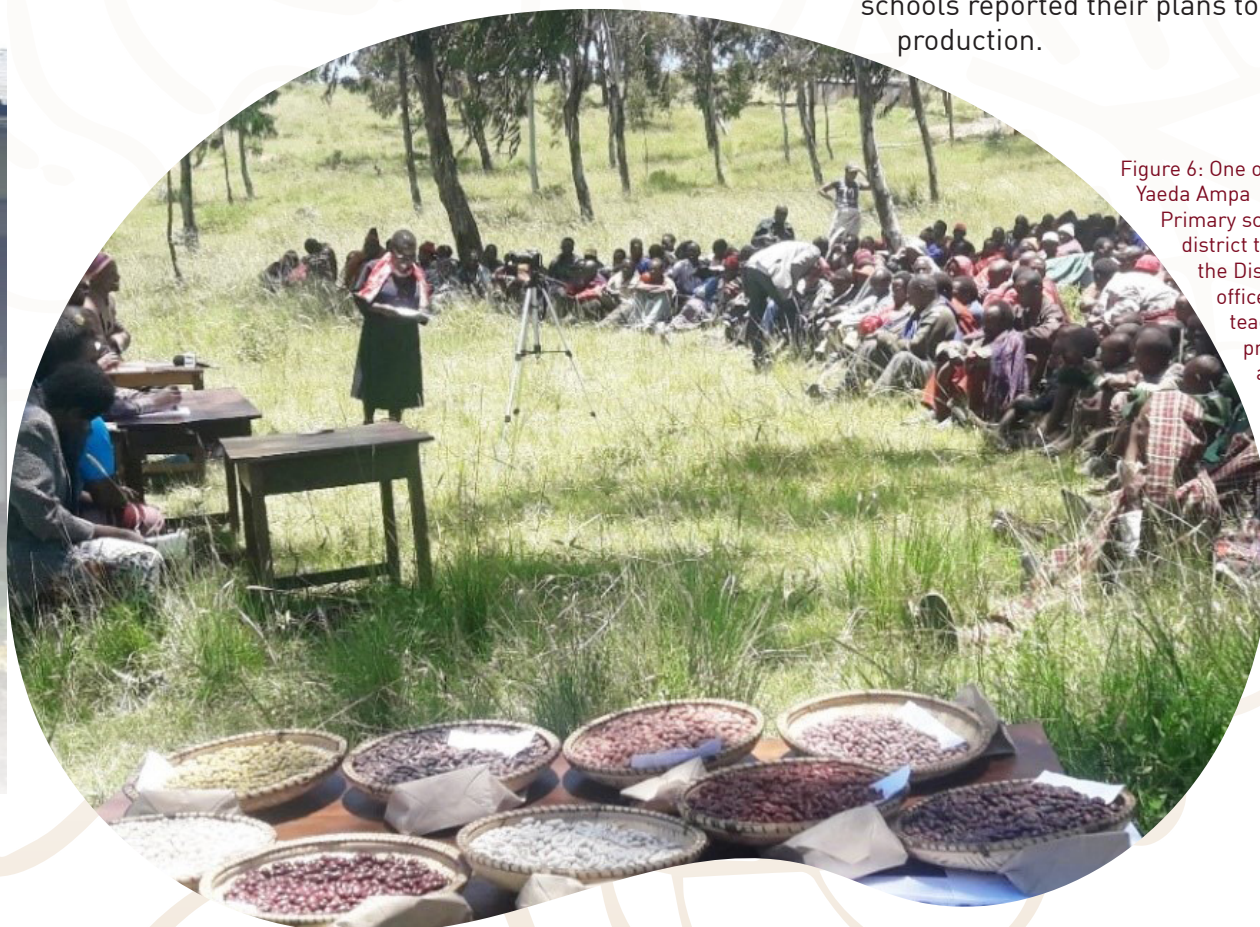


Figure 6: One of the field day at Yaeda Ampa Primary school in Mbulu district that attended by the District executive officer, students, teachers, seed producers, agrodealers and TARI



*Figure 7:  
JESCA field  
by Inukeni  
women in Mbozi  
district*

### **3.3 School teachers, farmers and learners skills and knowledge enhancement**

Several school trainings and promotion conducted by TARI and its partners at districts, exposed teachers, learners and neighbouring communities to information among them; i) how HIBs can contribute to reducing malnutrition among children and other vulnerable groups, ii) how pre and post-harvest management practices including pest and disease control, post-harvest handling and seed/grain marketing, agronomy and organizational development, technology promotion of HIBs and iii) seed production and multiplication. These have led to the growing demand for seed. For example, more than two tons of beans produced from demonstration plots in schools were passed to the communities. As a result of these interventions, several development partners e.g. Project Concern International (PCI), based in Mara region are including HIBs in their food and nutrition security

development interventions. Since 2019, they have distributed 400kg seed of JESCA in 40 primary schools as part of school feeding initiatives within Mara region. Promotion and dissemination of high iron beans through demonstration plots was the most adopted approach through farmers groups and schools.

Furthermore, seed producers were linked with farmers and research stations to get seed for further multiplications. In some regions around Itega primary school in Mbeya, this programme was an opportunity to schools and communities to discover that beans can grow on their land. The communities compared different complementary technologies bundled with improved seed; which included use of seed spacing, fertilizers, safe use of agro chemicals to control pests and diseases

### 3.4 Catalysing private investment in HIB value chain

#### 3.4.1 Seed multiplication

The increasing demand for HIB seed has attracted other public and private entrepreneurs to invest in the multiplication of Selian 14, Selian 15 and JESCA varieties to bridge the gap. Together, TARI

Maruku and TARI Uyole have increased the basic seed production with private seed companies such as BEULA, ALLSEM and BAYMAC, taking up the seed multiplication role which increased production to 39.6 MTs and 111.9 MTs of Quality Declared Seed (QDS) classes by 2020 (Table 2 and 3). Farmers were trained in seed multiplication of QDS to respond to the growing demand for seed in different locations. (Table 3).

Table 2: Production of certified seed (MT)

Seed producer	2016	2017	2018	2019	2020
TARI Maruku				1.5	11.6
ASA	1.4	14	3.2	4	6.7
MERU AGRO					13.4
BEULA SEED co					4
ALLSEM			4		2.3
SUBA Agro				5.5	1.6
TARI Uyole				0.6	
<b>Total</b>	<b>1.4</b>	<b>14</b>	<b>7.2</b>	<b>10.1</b>	<b>39.6</b>

Table 3: Production of QDS by various partners in different locations

Location/District	Amounts of QDS produced (MT)		
Mbulu	0.22	5	2
Babati	0.8	3	1.3
Karatu	0.75	6	1.4
Monduli and Karatu		2	8.9
Dodoma, Iringa		9	9.6
Morogoro		4	3.2
Karatu, Babati, Meru and Morogoro		3	36.9
Lushoto		2.5	1.3
Arusha			4.7
Misenyi	0.2		4.8
Arusha			16.1
Momba			6.8
Mbozi			6.6
Mufindi			1.8
Wangingómbe			1.4
Kilolo			0.5
Iringa			4.6
Momba, Iringa, Kilolo, Mufindi, Mbozi, Wangingómbe			29.4
Karagwe	0.85		
Kyerwa	0.43		
<b>Total</b>	<b>3.25</b>	<b>63.9</b>	<b>111.9</b>



Figure 8: JAGEF group (right) at their shop where HIB, composite flour from HIB are sold, Provita-min A maize and contracted farmer on the right side.

### 3.4.2 Value addition

Leveraging on experiences shared from other PABRA countries, the Alliance scientists engaged potential women entrepreneurs to process bean based flour to diversify school meals. Five entrepreneurs (JAGEF group, Maisha Plus, AggyStar, Marcelina Magezi, and Fredrick Kitone) were trained on bean flour processing. In less than three years, supplying 0.5 ton (per month) of bean flours to 3 schools (day care) with an average

of 20 to 30 kids per school and 3 tons per month to the community members, retailers and other food venders. The bean processors provide market to grain producers. For example, in 2021, JAGEF group in Moshi contracted 10 farmers to produce JESCA grains for processing (Figure 8). To ensure compliance of quality standards, JAGEF group has acquired certificate from Tanzania Bureau of Standards (TBS) which will enable them to expand production and serve wider market.



## 4. Conclusion

Working with a multisectoral team, including local authorities is key in accelerating the diffusion and scaling up of high iron beans (HIB) varieties to schools and the wider community. The school feeding program – is an innovative approach of using improved seed of HIBs coupled with various interventions, can result in increased demand for seed for multiplication to produce grain for consumption. The involvement of private sector led promotions of HIB spurs business growth encouraging other value chain actors to invest. Bundling of seed and other technologies propels communities to make informed decision on adopting HIBs.

*Ester Moshi (JAGEF group) displaying bean-based products – World Food day 2021 in Moshi*



*Pupils from Makonge Primary schools in Bukoba district enjoying porridge from a mixture of HIB (JESCA and maize)*



## 5. Acknowledgements

This report is a collective contribution of a team of researchers from the Tanzania Agricultural Research Institute (TARI), the Alliance of Bioversity International and CIAT (Alliance) through the bean programme – Pan Africa Bean Research Alliance (PABRA). We gratefully acknowledge the contribution of the Government of Tanzania through TARI, particularly its National Bean Research Programme at Maruku, Selian and Uyole research centers. We express great gratitude to our donors, especially the Swiss Agency for Development and Cooperation (SDC), Global Affairs Canada (GAC) and Bill and Melinda Gates Foundation, Australian Centre for International Agricultural Research (ACIAR), The Africa Development Bank through the Technologies for African Agricultural Transformation (TAAT) project who greatly contributed to the Alliance-PABRA and TARI partnership. Special thanks to TARI and Alliance managements who supported and facilitated the research.

Finally, yet importantly, we are grateful to communities and schools in the various districts in Tanzania who participated and provided valuable information that informed this policy.

## 6. References

- Alphonse, R. (2017, October 26). Addressing the mismatch between food and nutrition policies and needs in Tanzania. Retrieved from <https://www.brookings.edu/blog/africa-in-focus/2017/10/26/addressing-the-mismatch-between-food-and-nutrition-policies-and-needs-in-tanzania/>
- Garrett, James; Bassett, Lucy; and Levinson, F. James. 2011. Multisectoral approaches to nutrition. In Working multisectorally in nutrition: Principles, practices, and case studies. Garrett, James; and Natalicchio, Marcela (Eds.). Chapter 2. Pp. 8-19. Washington, D.C.: International Food Policy Research Institute (IFPRI). <http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/129740>
- Laura E Murray-Kolb,<sup>1</sup> Michael J Wenger,<sup>2,3</sup> Samuel P Scott,<sup>1</sup> Stephanie E Rhoten,<sup>2</sup> Mercy G Lung\_aho,<sup>4</sup> and Jere D Haas<sup>3</sup> (2017) Consumption of Iron-Biofortified Beans Positively Affects Cognitive Performance in 18- to 27-Year-Old Rwandan Female College Students in an 18-Week Randomized Controlled Efficacy Trial The Journal of Nutrition doi: 10.3945/jn.117.255356
- [https://www.kilimo.go.tz/uploads/dasip/English\\_version\\_Final\\_new2.pdf](https://www.kilimo.go.tz/uploads/dasip/English_version_Final_new2.pdf)



*Pupils from Izuo Primary school in Mbeya district weeding their school plots*



Alliance

