

DR Congo: Government Driven Adoption and Commercialization, Supported by World Bank Loans and Grants

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Biofortified crops with value chain activities: **Iron Bean, Vitamin A Maize, Vitamin A Cassava**

Biofortified crop varieties released to date or in the R&D pipeline

| Beans: 17 varieties | Maize: 6 varieties | Cassava: 4 varieties |
|---------------------|--------------------|----------------------|
| HM 21-7 | SAM 4 VITA | KINDISA |
| COD MLB 033 | PVA SYN 18(F2) | VIMPI |
| ECAPAN 21 | PVA SYN 10 | MUKOLESHI |
| PVA 1438 | PVA SYN 13 | LUMONU |
| RWR 2245 | PVA SYN 9 | |
| RWR 2154 | PVA SYN 7 | |
| HARLUB 1 | | |
| NAMULENGA | | |
| CUARENTINO 0817 | | |
| COD MLV 059 | | |
| MAC 44 | | |
| RWV 1129 | | |
| NUA 100 | | |
| NUA 99 | | |
| M 211 | | |
| COD MLB 104 | | |
| NUA 296 | | |

Current donors and funding cycle

| Donor | Status Activities | Funding cycle |
|----------------------|---------------------------------------|--------------------------|
| Government of DRC | Scaling of biofortification | Ongoing |
| Government of Canada | Food and Nutrition COVID-19 Responses | Ending in September 2022 |

Principal strategies for scaling biofortified crops

- Seed variety development
- Seed stocks production, management, and dissemination
- Introduction of seed through demonstration plots, fairs, and agricultural expos
- Capacity strengthening for value chain actors (producers, processors, dealers, retailers) on quality biofortified production and products
- Awareness campaigns, farmer field days, policy maker engagement, media interactions, and engaging other value chain actors to promote production and consumption of biofortified crops
- Warehousing strategic seed
- Seed sales through seed fairs and direct marketing
- Develop linkages with processors
- Develop marketing and communications strategies to promote the health benefits of biofortified crops
- Conduct research related to biofortified products and acceptance level

Delivery strategies for biofortified crops

- Distribution of subsidized seed produced by contracted seed growers
- Directly purchasing seed from growers
- Distributing of seed to farmers via a payback system and pass on

Commercial value chain activities for biofortified crops

1. Agricultural research

- Breeding R&D activities are carried out with the National Institute for Agricultural Research (INERA)
- Four bean varieties are in the pipeline for release: CODMLB104, NUA 296, CODMLB033, HARLU 1
- Desired traits include: resistance to pest and disease; high-yielding; tolerance to drought and flood; early maturing; high carotenoid content; high iron and zinc content; high dry matter content; and cookability.

2. Seed and Vine release

- Basic seed production for cassava, beans, and maize; for orange sweet potato, the selection starts in 2022, but no vines will be released until 2023.

3. Commercial seed production

- Contracting and building operational capacity of seed growers; maize and bean seeds are sold to public consumers (producers), but for cassava seed, they usually get for free or low cost.

4a. Farming/growing

- There is no difference in farming practices between biofortified crops and non-biofortified crops.

4b. Fertilizers and agronomic biofortification (including scope or demand)

- At the household level, usually only organic fertilizers are used due to the high cost of mineral fertilizer and the small portion of land needed to produce (0.5 ha).

5. Aggregation

- This is done in the production zone before transportation to the consumption zone without any processing.

6. Milling

- This is done in the production zone before transportation to the consumption zone without any processing.
- Yellow color is a limiting factor for cassava flour for most consumers; in some provinces, yellow maize flour is more popular among consumers than white flour and vice versa in other provinces. There is no milling for beans.

7. Processing

- Most cassava is processed to get dried cassava macro chips from which we get Fufu (pastry obtained after boiling fermented cassava flour mixed with water), cassava baking flour (non-fermented cassava flour) and *chikwangu* (cassava bread made from fresh fermented roots) and in a few cases it is processed to produce *gari*.
- For maize, it is processed/milled into flour used to produce cakes, biscuits, and pastries. The predominant uses of cassava and maize flour are to make pastries, mixed or not. No processing is required for beans.

8a. Retailing

Cassava is sold mainly by retailers in two forms: macro chips and flour in a poly bag, in a jute, in buckets, and in a pile in retail and wholesale markets.

- For maize, it is sold in two forms: grain and milled (flour) packaged in a poly bag, jute or bucket.
- Beans are also sold in poly bags, jute, and other small sales units in retail and wholesale markets. Labeling and packaging have been used for beans, milled maize and cassava flour in some markets.

8b. Public procurement (schools, hospitals, safety net schemes)

- There is no systematic school- or hospital-targeted procurement; at some points the country program collaborated with health zones for promotion of biofortified products.

9a. Consumption on farm

- According to studies conducted, 40% of beans harvested (43% for maize) are allocated to on-farm consumption.

9b. Commercial food consumption (by all population)

- Data not available, data not collected.

9c. Consumption from institutional settings (schools, hospitals)

- There is no school or hospital feeding program in the country. Most contracts with international NGOs are for production of seed that they distribute to vulnerable people.

Non-commercial value chains, conflict, or fragile environments

Integration of NECs in food security and nutrition programs mostly reach producer households and/or people served by public institutions, including those in fragile and conflict affected settings. *What is the minimum package of interventions that should be considered?*

| | Value chain step | Activities |
|----|--|---|
| 2 | Seed and Vine release | <ul style="list-style-type: none">• Seed distribution. |
| 3 | Seed production | <ul style="list-style-type: none">• From basic seed produced with INERA, agri-multipliers are contracted to produce seed. |
| 2 | No commercial seed/vine dissemination to farmers | <ul style="list-style-type: none">• From agri-multipliers, seeds are disseminated to farmers through direct and indirect channels); sometimes, partners are contracted to do the dissemination to farmers. |
| 4a | Farming/growing | <ul style="list-style-type: none">• At farmer level, dissemination is done farmer-to-farmer (one who received the seed gives some to 2-4 other farmers during the next cropping season).• Farmers can also cultivate a community field from which seeds (cuttings) are shared between members after harvest. |

| | | |
|----|---|---|
| 6 | Access to markets and steps taken improve livelihoods | <ul style="list-style-type: none"> To facilitate access to market, agro dealers, farmer's associations and other producers are linked. In most cases, seeds are sold or made available to producer associations or others at low prices to allow them to make a profit. |
| 8b | Access to public procurement mechanisms (e.g. emergency programs, food aid, etc.) | <ul style="list-style-type: none"> Very low access. |

Other agricultural activities and points of consideration

Promotion of agrobiodiversity: Farmers are encouraged to conduct in situ conservation; this is also the case at the INERA stations.

Soil health monitoring and improvement: Research activities on biofortified crops conducted in on-farm trials contribute to the training of the population regarding benefits of soil fertility and maintenance, such as intercropping trials in agroforestry.

Seed quality: Seed inspectors at both the provincial and national levels are involved throughout the process, starting with the determination of the field through certification. Laboratory tests are carried out at several stages to ensure the quality of the available seed. However, at the household level, measures to safeguard the quality of the seed are very often neglected or not considered by the farmer.

Policy, advocacy and enabling activities

| Activity | Summary |
|---|--|
| Government advocacy and engagements | <ul style="list-style-type: none"> The government, through the national nutrition program (PRONANUT), started to pay more attention to the benefits of biofortified crops. |
| Policy inclusion (list all relevant policies agriculture and nutrition) | <ul style="list-style-type: none"> Plan National d'Investissement Agricole (PNIA) 2014. |
| Standards and regulations | <ul style="list-style-type: none"> Publicly Available Specifications 233, 234, 235. Food labelling, nutrition and health claims exist for foods, but guidance is required for food businesses to follow them. Work is required in this area. |
| Market research | <ul style="list-style-type: none"> The country program conducted a study on consumer acceptance of the yellow biofortified cassava and in carotenoids retention in biofortified yellow cassava. |
| Technology advancements | <ul style="list-style-type: none"> Work is required in this area. Initial plans for farmer platforms will commence in September 2022. |
| Data collection | <ul style="list-style-type: none"> At the national level, data for the agriculture sector are available but are not updated regularly. For biofortified products, each year a monitoring survey is carried out to collect data on outcome indicators. |
| Gender and inclusivity | <ul style="list-style-type: none"> In each activity realized (capacity building, farmer field days, fair, dissemination activities, awareness, field school, etc.), effort is made to reduce gender disparities. |

Monitoring and evaluation, reach in 2022

| Seed Volumes | Grain Volumes | Commercial food products |
|---|--------------------|---|
| Production expected this year: more than 554.4 of iron beans; 237.7 MT of vitamin A maize; 6,300,000 cassava Stems; and 1,050,000 orange sweet potato vines | No data available | The main commercial food products for cassava and maize are: cassava and maize flour packaged in poly bags of 20-30 kg, or cassava macro chips packaged in poly bags of 50kg; maize grain packaged in poly bags of 100kg; and beans packaged in jute/poly bags of 80-100kg. 40% of beans and 43% of maize harvested is allocated for on-farm consumption; the remainder enters commercial markets. |
| Market share less than 3% | Market share % N/A | Data on market share is not currently collected and will be done in 2022 |

Consumer reach

| | |
|---------------------------|---|
| Households growing | 725,951 for iron beans |
| | 697,673 for vitamin A cassava |
| | 148,241 for vitamin A maize |
| Off farm consumption | Approx. 60% of food produced enters commercial supply chains. |
| Institutional consumption | Very low. More work is required in this area to include bio-fortification in institutionally procured foods using the PAS for buying standards. |

SWOT analysis – summary

| Strength | Weaknesses |
|--|---|
| <ul style="list-style-type: none"> Strong support from the National Agriculture Research Institute (NARI) Better price for biofortified crops than normal crops Various varieties of crops released | <ul style="list-style-type: none"> Low awareness of biofortified products Low knowledge on the health benefits of biofortified crops by farmers Difficult to recognize products visually without lab analysis |
| Opportunities | Threats |
| <ul style="list-style-type: none"> Strong support and commitment from National Nutritional Program (PRONANUT) High demand for staple foods | <ul style="list-style-type: none"> Yellow color of vitamin A cassava; high competition with white varieties Confusion of biofortification with GMOs Rigid food habits (especially regarding vitamin A cassava) Dependence on international programs to conduct activities (germplasm, crop dissemination, etc.) |

About the author: Toussaint Kendenga is a Senior Research Associate specializing in monitoring and evaluation at HarvestPlus DRC. Prior to joining HarvestPlus, Kendenga worked as a Research Associate specializing in Monitoring specialist at IITA and researcher at the University of Kinshasa, DRC Ministry of Agriculture, GRET, IRM and ISCO-ASES.

These case studies were developed in collaboration with the FAO as part of a Letter of Agreement to create “Guidance and tools to promote nutrient enriched crops as part of healthy diets to address micronutrient deficiencies in vulnerable rural communities”