



Delivery of Biofortified Food Basket in Latin America & the Caribbean

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Current Status: Because most Latin American and Caribbean (LAC) countries do not consume large amounts of a single staple crop, a different approach must be used in biofortification: a food basket. Elements of the food basket include iron beans, zinc rice, vitamin A cassava, vitamin A and zinc maize, and orange sweet potato (OSP). Supplementation and fortification programs in LAC are strong and reach much of the population, so HarvestPlus LAC focuses particularly on reaching the rural poor, who may not have access to these other complementary interventions, with the biofortified food basket.

Breeding biofortified crops for LAC was previously coordinated by AgroSalud, based at the International Center for Tropical Agriculture (CIAT), and has now been integrated into the HarvestPlus portfolio. Additionally, the government of Brazil supports BioFORT Brazil, coordinated by Embrapa, which focuses efforts on the poorest areas of northeast Brazil and aims to improve nutrition through school-feeding programs.

Varietal Release: BioFORT Brazil has been working on biofortification for more than 10 years and has released several biofortified varieties of maize, sweet potato, cowpea, cassava, and beans. Additional research is ongoing for wheat and rice. The following table presents the varieties that have been released or are in testing, with comparison to their conventional counterparts provided.

Biofortified Crops for Brazil

Crop	Variety Name	Iron (Fe) Content	Zinc (Zn) Content	Provitamin A Content	Content in Conventional Cultivars
Maize	BRS 4104	-	-	5-8 ppm	2-4 ppm provitamin A
Sweet potato	Beauregard	-	-	90-140 ppm	0-10 ppm provitamin A
Pumpkin	On-going research	-	-	140-240 ppm	20-60 ppm provitamin A
Wheat	On-going research	40-50 ppm	40-50 ppm	-	25-35 ppm Fe; 30-40 ppm Zn
Cowpea	BRS Xiquexique, BRS Tumucumaque, BRS Aracê	50-70 ppm	40-50 ppm	-	40-50 ppm Fe; 30-40 ppm Zn
Cassava	BRS Jari, BRS Gema de Ovo, BRS Dourada	-	-	4-9 ppm	0 ppm provitamin A
Common Beans	BRS Pontal, BRS Agreste, BRS Cometa	70-90 ppm	35-50 ppm	-	25-65 ppm Fe; 10-35 ppm Zn
Rice	On-going research	2-5 ppm	15-20 ppm	-	0.5-2 ppm Fe; 5-12 ppm Zn

*Parts per million (ppm)

In other LAC countries, varietal releases to date include iron beans in El Salvador, Panama, Nicaragua, and Guatemala. Additionally, promising varieties of zinc rice are being tested in Bolivia, Panama, and Nicaragua. Going forward, AgroSalud will focus its attention on three priority countries—Guatemala, Haiti, and Nicaragua—where women and children suffer from the highest levels of vitamin and mineral deficiencies in the region.

Biofortified Beans Released in LAC

Variety Name	Country	Iron Content* (% target)	Zinc Content* (% target)
CENTA FERROMÁS	El Salvador	75-80 ppm (80-85%)	35 ppm (71%)
NUA 24	Panama	77 ppm (82%)	30 ppm (61%)
NUA 296	Panama	88 ppm (94%)	32 ppm (65%)
INTA Nutritivo	Nicaragua	63 ppm (67%)	28 ppm (57%)
Superchiva	Guatemala	59 ppm (63%)	31 ppm (63%)

* Measured by XRF

Seed Distribution: BioFORT Brazil uses demonstration plots, organized through the national extension system, to provide smallholder farming households with seeds and stems for biofortified crops. Distribution in Panama is just getting underway, and HarvestPlus is helping to strengthen the seed system to increase rates of seed multiplication.

Marketing: In Colombia, collaboration with the private sector offers a market for farmers' biofortified crops, which are then processed into typical Colombian products, such as *mazamorra* and *natilla*, made from biofortified maize, as well as zinc rice noodles and vitamin A cassava and sweet potato flour. In Brazil, as part of a school-feeding pilot project, 10 cities have added iron beans, vitamin A cassava, and OSP to their programs, ensuring that small-scale farmers who grow biofortified crops have a market for their excess production.

Stakeholders: Partnerships are extremely important to the delivery efforts in LAC and range from public sector partnerships, such as with the governments of Brazil and Panama that have created and support national biofortification programs, to private-sector partnerships, such as with Pampa Ltd. Stakeholder workshops were held in late 2013 in Guatemala and Nicaragua; both countries have established national committees for the inclusion of biofortification in food security policies.

Potential Impact: From 2009–2013, nearly 2,000 farming households were reached across five states in Brazil. In the states of Bahia, Maranhão, Minas Gerais, Piauí, Rio de Janeiro, and Sergipe, about 30 schools are including biofortified foods in their menus, benefitting more than 5,000 children around the country. The state of Piauí contains the largest number of partnerships formed. The partnerships are developed in conjunction with Agricultural Family Schools (EFAs), technical assistance companies, and municipal governments and serve as a model of *Productive Safety*, a set of measures needed to reduce the risks of production losses and enable small farmers to produce their own food with guaranteed harvest.

Delivery Challenges and Recommendations:

- Coordination of research and delivery across numerous countries can be difficult and unfocused as approaches differ by country.
- Nutrition evidence is not complete for varieties developed under AgroSalud.
- In Phase III, HarvestPlus will increase its work in LAC, focusing on developing a biofortified food basket for Guatemala, Haiti, and Nicaragua.
- HarvestPlus LAC will also develop a more complete portfolio of evidence around nutrition and adoption.