



An Initiative of the  
African Union Commission  
Department of Rural Economy  
and Agriculture

## IN SUPPORT OF AN AFRICAN UNION CONTINENTAL DECLARATION ON BIOFORTIFICATION

### BIOFORTIFICATION

Is the process of conventionally **breeding** staple food crops that are naturally enriched with micronutrients.

Biofortification is one element of a nutrition-sensitive national agricultural research and investment strategy. It is particularly beneficial for smallholder farming families who rely on staple crops for the bulk of their diet and who have limited access to other important nutrition interventions.

This brief provides substantial evidence on the contribution of biofortification to improved nutrition, highlights the milestones achieved in Africa in scaling up biofortification, and suggests priority actions for an African Union Continental Declaration endorsing biofortification.

### PRIORITY ACTIONS

- **An African Union Continental Declaration on biofortification:** The African Union (AU) Heads of State should adopt a continental declaration that recognizes biofortification as a natural, cost-effective and sustainable solution to reducing micronutrient malnutrition in Africa. This high-level endorsement would send a powerful signal to AU Member States and thereby accelerate access to this important nutrition-sensitive agricultural intervention. Several Member States have already included biofortification in their official policies and programs. A continental declaration would accelerate adoption by other Member States, thereby increasing access to biofortified crops by those who would most benefit from it.
- **Enabling Policies:** The AU should call upon its Member States to include biofortification in relevant agriculture, food, nutrition, and health policies and programs of the ministries of Agriculture, Health, Education,

Finance, and Trade, and of National Planning agencies or authorities. Successful adoption of biofortification is inherently cross-sectoral and should involve public and private stake-holders. To maximize the impacts of biofortification, policy makers, donors, development partners, and program implementers should aim to mainstream it in relevant development interventions such as those impacting on health, gender, trade, food industry, and climate.

- **National Budget Allocations:** The AU should call upon its Member States to prioritize budget allocations for biofortification and nutrition-sensitive agriculture interventions for national adoption and sustainability.
- **Research and Development:** Continued efficacy studies and conventional breeding of nutrient dense and climate smart biofortified crops at the country level will build upon existing evidence. Governments should invest in the data gathering and reporting systems to evaluate the effectiveness of all interventions aimed at improving agriculture, health and nutrition.
- **Monitoring:** Monitoring and evaluation at the country level should be conducted to accurately track and measure impact, and assess progress towards achieving improved health, food and nutrition security targets. Assessment of impacts on health, gender, livelihood, and social protection is crucial to understanding the full burden of micronutrient deficiency.

### THE BURDEN OF MICRONUTRIENT DEFICIENCY

**MICRONUTRIENT DEFICIENCY**, also referred to as hidden hunger, affects 2 billion people worldwide and has seriously affected the nutrition and health status of millions of women and children in Africa. Almost half of children living in sub-Saharan Africa under five years of age suffer from vitamin A deficiency; a third are at risk of zinc deficiency; and 60 percent suffer from anemia, of which iron deficiency is a

Facilitated by:



**HarvestPlus**  
Better Crops • Better Nutrition

In Collaboration with:



**Food and Agriculture  
Organization of the  
United Nations**



**World Food  
Programme**



**RESEARCH  
PROGRAM ON  
Agriculture for  
Nutrition  
and Health**

Led by IFPRI



leading cause. The latest trends show that hidden hunger is on the rise in Africa, costing Africa billions of dollars in GDP growth annually.

## **THE CONSEQUENCE OF MICRONUTRIENT DEFICIENCY**

Micronutrients, although only required by the body in very small amounts, are essential to good health, cognition, and productivity. Many of the symptoms of micronutrient deficiencies cannot be seen – such as lower IQ, lower resistance to disease, and fatigue. This is why this form of malnutrition is known as “hidden hunger”.

Biofortification helps reduce the widespread gap between micronutrient requirements and intake by increasing the proportion of dietary vitamin A, iron, and zinc—three micronutrients of public health significance globally.

**Vitamin A deficiency** can result in growth retardation, damage to mucous membranes, impairment of normal vision—and ultimately blindness. Children with vitamin A deficiency are also at increased risk of severe morbidity from common childhood infections such as diarrhea and measles. Pregnant women with vitamin A deficiency may be at increased risk of mortality.

**Zinc deficiency** has serious consequences for health, particularly during childhood when zinc requirements are increased. It can cause stunting and increase the risk of common childhood infections including diarrhea and pneumonia.

**Iron deficiency** is the most common micronutrient deficiency in the world and a leading cause of anemia. Iron deficiency during childhood and adolescence impairs mental development and learning capacity. In adults, it reduces the ability to do physical labor. Severe anemia increases the risk of women dying in childbirth.

## **RATIONALE FOR AN AU CONTINENTAL DECLARATION ON BIOFORTIFICATION: EVIDENCE AND UPTAKE**

Peer-reviewed, published evidence (much of it conducted in Africa) has demonstrated that biofortified foods are a cost-effective, sustainable, and efficacious solution to improving nutrition and health.

### **General findings on how biofortification is reducing vitamin A deficiency**

- 50-100 percent of a child’s daily average vitamin A needs can be met by eating biofortified vitamin A staple crops like maize, cassava, and sweet potato.
- Eating vitamin A orange sweet potato regularly reduced the prevalence and duration of diarrhea in children and the likelihood of vitamin A deficiency in women.
- Daily consumption of vitamin A orange maize for six months significantly improved visual function in children.
- Children who consumed boiled vitamin A cassava demonstrated a modest but significant improvement in vitamin A status. Retention studies have shown that boiled vitamin A cassava can provide children with 100% of their daily average vitamin A needs when it’s consumed as a staple.

### **General findings on how biofortification is reducing iron deficiency**

- Iron beans and iron pearl millet provide up to 80% of daily average iron needs for young children and non-lactating, non-pregnant women.

- When eaten daily, iron beans—which contain up to twice the amount of iron as common varieties—helped prevent and reverse iron deficiency in young women. They also improved memory, attention, and other cognitive abilities critical for reaching one’s full potential in school, work and life.
- Iron pearl millet, recently introduced in Africa, resolved iron deficiency in school children and improved their memory and attention.

### **General findings on how biofortification is reducing zinc deficiency**

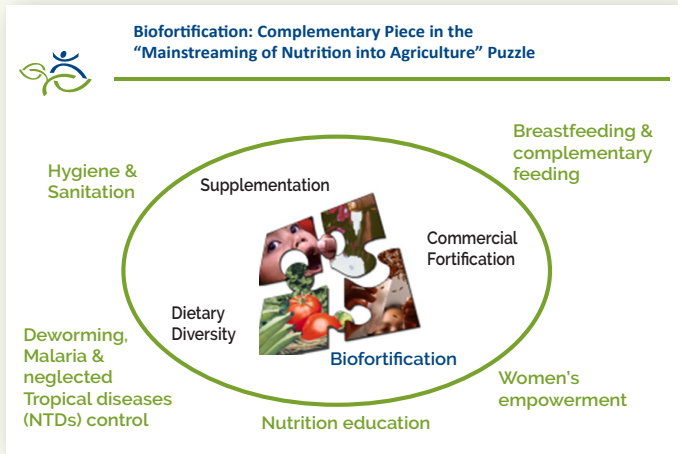
- Biofortified zinc wheat and zinc rice can provide up to 50% of the average daily zinc needs of children and women of reproductive age.
- Young children who ate foods prepared with zinc wheat spent significant fewer days sick with pneumonia and vomiting than children who ate conventional wheat.
- Eating 4 mg of extra zinc a day - the amount that biofortification can provide to populations who eat rice and wheat as staple foods - can reduce DNA ‘wear and tear’.

### **An Evidence-Based, Cost-Effective Solution to the Threat of “Hidden Hunger”**

- Using conventional crop breeding techniques, more than 290 varieties of nutrient-rich staple food crops have been tested or released in 60 countries around the world.
- More than 50 million people in rural households are now consuming these healthier foods.
- Data generated in Uganda show that biofortification costs \$15-\$20 per Disability Adjusted Life Year (DALY) saved, making it a highly cost-effective, nutrition-sensitive agricultural intervention.

## **HOW BIOFORTIFICATION WORKS**

- New varieties are developed and released by National Agricultural Research Institutes (NARIS) or organizations in collaboration with HarvestPlus and crop breeding centers of the CGIAR (Consultative Group on International Agricultural Research) .
- The key strategy in breeding is to cross materials high in the micronutrient with local varieties adapted to taste and agronomic preferences of the population. Hence, there is no true loss of biodiversity. Key genes are retained in the conventional breeding process.
- Once higher levels of nutrients have been bred into staple crops, they remain present in the plants’ seeds or cuttings for many years.
- When combined with interventions that promote dietary diversification commercial fortification through food processing and targeted supplementation to specific population groups, biofortified crops can contribute to resolving nutrient deficiencies at a significant scale.
- Public, private, non-governmental organizations, and development partners (UN Agencies) partner to undertake multiplication and delivery of planting materials to farmers.
- Farm households grow and consume biofortified crops to improve nutrition, health and productivity.
- Biofortified crops are distributed and marketed in raw and processed form to rural and urban consumers. Demand creation campaigns inform consumers of the benefits of biofortified crops and increase markets for farmers.



## AU ACTIONS ON BIOFORTIFICATION TO DATE:

- The 2<sup>nd</sup> AU Specialized Technical Committee Meeting on Agriculture, Rural Development, Water and Environment in October 2017 endorsed biofortification under STC/ARDWE/MIN49. The Committee stated that “biofortification complements industrial fortification, supplementation, and dietary diversity, and biofortification has a great potential to contribute significantly to the AU Malabo Declaration goal of reducing stunting to 10 percent and underweight to 5 percent by 2025”.
- The AU Executive Council, in its Thirty-Second Ordinary Session (22-26 January 2018, Addis Ababa, Ethiopia) Minute EX.CL/1041 (XXX11), endorsed the previously mentioned recommendation of the STC on Agriculture, Rural Development, Water and Environment.
- The 10<sup>th</sup> Africa Task Force on Food and Nutrition Development Meeting (19-21 June 2018, Bujumbura, Burundi) recommended for the: endorsement of biofortification by the Specialized Technical Committee on Health, Nutrition and Drug control to take place in 2019. HarvestPlus was recommended to work with Burundi government, an AU Member State, and host of the 10<sup>th</sup> ATFFND, AUC DSA, and its partners towards the Health Ministers’ STC endorsement on biofortification.

Biofortified staple crops are so much more than just calories. Biofortification provides a sustainable solution to increase the availability of vitamins and minerals for people who rely on staple crops for much of their diet.

## SUMMARY OF RECOMMENDATIONS FOR POLICYMAKERS

- 1) Guarantee leadership, commitment and strategic planning: To make progress in this area, it is essential that governments elevate universal access to biofortified crops and other nutrient rich food to a high position on the political agenda, backing up commitments with strategic planning, clear policies and dedicated budget allocation from the National Budget. To maximize socioeconomic benefits, it is important to identify priority areas, such as the dissemination of biofortified crops at health centres, schools and productive sectors as well as nutritional education.
- 2) Facilitate the development of biofortification national guidelines, the registration, certification and production of biofortified seeds or cuttings to allow for private and public sector multiplication and distribution.
- 3) Invest in effective delivery strategies to provide poor smallholder producers, both women and men, knowledge of, and access to biofortified crops, and promote their adoption and in-home consumption.
- 4) Promote uptake by farmers and consumption by targeting nutritionally-vulnerable populations through active social marketing, gender-sensitive extension guidance and potentially also via public sector procurement that supports institutional feeding programmes (such as in school, prisons, military, and hospital feeding).
- 5) Governments should invest in the data gathering and reporting systems to evaluate the effectiveness of all interventions aimed at improving agriculture, health and nutrition.

## How is Africa leading the way for biofortification implementation?

- Africa has played a strong leadership role in the development and dissemination of these nutrient-rich crops, including cassava, maize, and sweet potato enriched with vitamin A and beans and pearl millet enriched with iron.
- The first-ever large-scale deployment of a biofortified crop (vitamin A orange sweet potato in Mozambique and Uganda) laid the foundation for the global biofortification movement today. Biofortified crops are in testing or have been released in 38 countries in Africa to date.
- Fourteen African countries (Burkina Faso, Burundi, DR Congo, Ethiopia, Ghana, Malawi, Mozambique, Nigeria, Rwanda, Senegal, Tanzania, Uganda, Zambia, and Zimbabwe) already include biofortification in their policies and programs, and Heads of State in several AU member countries have publicly endorsed biofortification.
- African researchers, Dr. Robert Mwangi of Uganda and Dr. Maria Andrade of Cabo Verde, shared the 2016 World Food Prize for their pioneering work on biofortification.

## BIOFORTIFICATION AND AU POLICY/VISION

Biofortification contributes to the achievement of several AU policies and frameworks:

- **Agenda 2063 (“The Africa We Want”):**
  - Δ **Aspiration 1** (A prosperous Africa based on inclusive growth and sustainable development): “Incidences of hunger and malnutrition would have been reduced by at least 80% and hunger by at least 30% with accent on women”
  - Δ **Priority Area:** (Health and Nutrition): Goal 3 “Healthy and well-nourished citizens”
  - Δ **Key Transformational Outcome:** “Malnutrition, maternal, child and neo-natal deaths as at 2013 would be reduced by half by 2023”
- **Malabo Commitment # 3 (Ending hunger by 2025):**
  - Δ “End hunger, reduce stunting to below 10% by 2025”
- **AU DREA Business and Operational Plan 2017-2021:**
  - Δ Sub-Programme 3.4: “Expanded food biofortification and food systems”.

## REFERENCES

- Beer H, Luna S, Pompano L, Przybyszewski E, Udipi S, Ghugre P and Haas B. 2014. Consuming Iron-biofortified pearl millet increased hemoglobin concentrations and prevented a decline in energy efficiency in Indian girls. *FASEB Jou.* 28: 1, Supplement 646.7. [http://www.fasebj.org/content/28/1\\_Supplement/646.7](http://www.fasebj.org/content/28/1_Supplement/646.7)
- Chowdhury M. 2014. Address of ICN2 by Ms. Matia Chowdhury, Honorable Minister for Agriculture, Government of People's Republic of Bangladesh, November 2014, Rome, Italy. <http://www.harvestplus.org/sites/default/files/Bangladesh%20Statement%20at%20ICN2.pdf>
- Gannon B, Kaliwile C, Arscott S, Schmaelzle S, Chileshe J, Kalungwana N, Mosonda M, Pixley K, Masi C and tanumihardjo S. 2014. Biofortified orange maize is as efficacious as a vitamin A Supplement in Zambian children even in the presence of high liver resources of vitamin A: a community-based, randomized placebo controlled trial. *American Journal of Clinical Nutrition*, 100: 1541-50.
- Global Panel Policy Brief No.1/February 2015. Biofortification An Agricultural Investment for Nutrition
- Global Nutrition Report. 2014. Actions and Accountability to Accelerate the World's Progress on Nutrition. Washington, D.C.: International Food Policy Research Institute.
- Haas J, Beard J, Murray-Kolb L, del Mundo A, Felix A and Gregorio G. 2005. Iron-biofortified rice improves the iron stores of nonanemic Filipino women. *Jou. Nutr.*, 135: 2823-30.
- HarvestPlus. 2014. Kigali Declaration on Biofortified Nutritious Foods. Second Global Conference on Biofortification, March 31st-April 2nd, 2014, Kigali, Rwanda. <http://biofortconf.ifpri.info/files/2014/04/Kigali-Declaration-on-Biofortified-Nutritious-Foods-April-9-20142.pdf>. 2014b. Nutritious Staple Food Crops: Who is Growing What? Infographic. <http://www.harvestplus.org/sites/default/files/Infographicpdf>
- 2014c. Collaborators. <http://www.harvestplus.org/content/collaborators>
- 2014d. Biofortification Progress Brief: August 2014. Washington, D.C. [http://www.harvestplus.org/sites/default/files/Biofortification\\_Progress\\_Briefs\\_August\\_2014\\_WEB\\_2.pdf](http://www.harvestplus.org/sites/default/files/Biofortification_Progress_Briefs_August_2014_WEB_2.pdf)
- Hotz C, et al. 2012. Introduction of  $\beta$ -carotene rich orange sweet potato in rural Uganda resulted in increased vitamin A intakes among children and women and improved vitamin A status among children. *Jou. Nutr.* 142: 1871-80.
- Van Jaarsveld P, Faber M, Tanumihardjo S, Nestel P, Lombard C, and Spinnler Benadé A. 2005. B-Carotene-rich orange-fleshed sweet potato improves the vitamin A status of primary school children assessed with the modified-relative-dose-response test. *Am J Clin Nutr*, 81 (5): 1080-87.
- Jamil K, Brown K, Jamil M, Peerson J, Keenan A, Newman J and Haskell M. 2012. Daily Consumption of Orange-Fleshed Sweet Potato for 60 Days Increased Plasma  $\beta$ -Carotene Concentration but Did Not Increase Total Body Vitamin A Pool Size in Bangladeshi Women. *Jou. Nutr.* 142 (10): 1896-1902.
- De Moura F, Palmer A, Finkelstein J, Haas J, Murray-Kolb L, Wenger M, Birol E, Boy E, and Peña-Rosas JP. 2014. Are Biofortified Staple Food Crops Improving Vitamin A and Iron Status in Women and Children? New Evidence from Efficacy Trials, *Adv Nutr* (5): 56-570. doi:10.3945/an.114.006627
- Talsma E. 2014. Yellow cassava: efficacy of provitamin A rich cassava on improvement of vitamin A status in Kenyan schoolchildren. Dissertation for Wageningen University, Netherlands. <http://library.wur.nl/WebQuery/wurpubs/454759>
- UNICEF, WHO, World Bank Group Joint Malnutrition Estimates, 2018 Edition.

## CONTACT:


**African Union Commission  
Department of Rural Economy and  
Agriculture**

P. O. BOX 3243 Roosevelt Street  
(Old Air Port) W21K19  
Addis Ababa - Ethiopia  
Tel: (251) 115 517 700  
Fax: (251) 115 517 874.

**HarvestPlus**

*Better Crops · Better Nutrition*

C/o IFPRI 1201 Eye St, NW,  
Washington DC, 20005, USA  
Email: [HarvestPlus@cgiar.org](mailto:HarvestPlus@cgiar.org)  
[www.HarvestPlus.org](http://www.HarvestPlus.org)

 Facebook  Twitter