

Two biofortification processes to increase food micronutrient content



Participatory varietal evaluation with members of the farmers' organisation VFTV-FIFATA in the commune of Manandona, Madagascar. © S. Castro Pacheco, 2023

Biofortification is a process by which foods are fortified with micronutrients. At CIRAD this is done via two methods: varietal improvement of conventionally-grown plants (without GMOs) and the use of agroecological farming to provide plants with minerals that accumulate in their edible parts

In addition to nutritional qualities, these crops are adaptable, productive, healthy and possess excellent sensory qualities, and have been accepted by producers and consumers.

Micronutrient deficiencies, also known as “hidden hunger,” is a form of malnutrition affecting more than 1.5 billion people worldwide, in both rural and urban areas. One way to combat this is to produce foods rich in micronutrients. Biofortification produces micronutrient-enriched cereals, legumes, roots, and tubers. These biofortified foods do not require any additional processing and are available to producers and consumers at market stalls.

Work carried out by the projects

- Rice varieties naturally rich in micronutrients (e.g. zinc) are being identified, created, or developed through producer - consumer partnerships (Colombia, Bolivia, Madagascar).
- Naturally micronutrient-rich varieties of cowpea, orange-fleshed sweet potato (Senegal), and teff (Ethiopia) have been enriched with iron, zinc, and vitamin A through a combination of organic fertilization and the use of soil microorganisms (beneficial indigenous microorganisms and mycorrhizae).

Projects involved

- HarvestPlus – a CGIAR research project on Agriculture for Nutrition and Health (A4NH)
- Or4Food – Organic residual products for biofortified food for Africa, funded by the African Union Commission and the European Commission.



Lessons learned from the projects

Both biofortification methods, varietal improvement of plants (without GMOs) and application of organic fertilizer combined with beneficial microorganisms, have demonstrated their ability to increase micronutrient content in different foods (cereals, legumes, tubers, etc.). They have also demonstrated that biofortification, whether using varietal or agroecological techniques, is fully compatible with agroecological production.

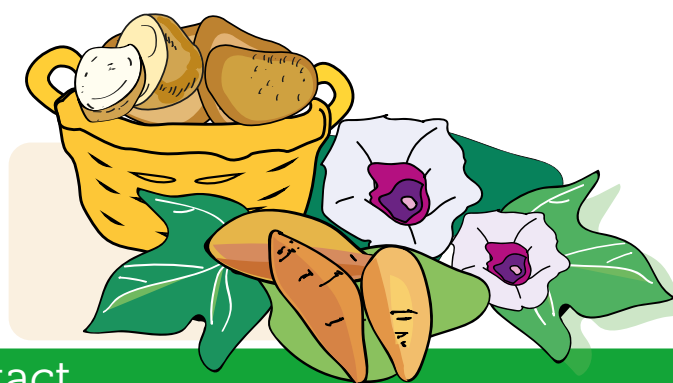


Harvesting a biofortified orange-fleshed sweet potato © E. Noumsi Foamouhoue

Recommendations to policy makers

- These two methods of biofortification should be combined to maximise their impact and improve the nutritional status of macronutrient-deficient populations.
- Public bodies must promote agroecological production and varietal selection of micronutrient-rich plants. This should be combined with recycling of local organic waste and the use of effective endogenous microorganisms for better soil health, thus ensuring agroecological biofortification in agricultural production.
- Biofortification, whether varietal and/or agronomic, in no way precludes dietary diversification, a desirable and overarching objective. These two approaches should be complementary over time. Biofortification provides a rapid, though imperfect, response to nutritional and human health needs, while diversification represents a more holistic approach addressing challenges in the food production system. This remains a major issue in many regions of the world where certain physical factors are highly limiting (access to water, land, extreme climate, etc.) and require a long-term territorial approach.

Find out more



Contact

Cécile Grenier
cecile.grenier@cirad.fr

Paula Fernandes
paula.fernandes@cirad.fr

Jean Michel Médoc
jean-michel.medoc@cirad.fr