



NUTRIENT-ENRICHED CROPS

quick guide



What are nutrient-enriched crops?

Nutrient-enriched crops are grown to have an enhanced nutritional value. Unlike other forms of fortification, in which vitamins and minerals are added to foods manually and post-harvest, nutrient-enriched crops are cultivated to have a higher nutrient content. This is achieved through agricultural practices or plant breeding.



Methods

There are two ways to produce nutrient-enriched crops:

Agronomy

Agronomy is the application of mineral-enriched fertilisers to the soil or plant leaves, to increase the micronutrient content of the edible crop. Agronomy provides a quick and relatively inexpensive path to addressing micronutrient deficiencies, but it is often seen as a short-term solution.

In Finland, nationwide agronomic selenium biofortification has been practised since 1985, and has resulted in significantly increased selenium concentrations in cereal grains. In turn, this has led to decreased selenium deficiencies among the population. Average dietary intake of selenium doubled from 1985-2014.

Selenium is an essential trace mineral that's important for many bodily processes, including cognitive function, a healthy immune system and fertility.

Conventional plant breeding

Conventional plant breeding is the artificial cross-pollination of plants to increase desirable characteristics. These characteristics include yields as well as micronutrient levels. Since this fortification technique began in the early 1990s, more than 290 varieties of 12 staple foods have been released in over 60 countries. Today, more than 10 million smallholder farmer families (about 33 million people) are growing and eating staple foods fortified with this technology. Howarth Bouis, the man who first proposed and developed the concept, was awarded the World Food Prize in 2016 for taking it from hypothesis to practice at global scale.



Why enrich crops?

Nutrient-enriched crops are effective for reaching vulnerable populations – such as the rural poor – who rely on subsistence agriculture or informal markets for their food. Such populations often have limited access to diverse diets, and are hard to reach through other fortification activities.

Projects promoting nutrient-enriched crops mainly concentrate on boosting three micronutrients – iron, zinc and vitamin A; some projects have also enriched crops with amino acids and protein.

Examples of nutrient-enriched crops include:

- Rice, sweet potato, cassava, legumes, sorghum and millet enriched with iron.
- Wheat, rice, beans, sweet potato and corn enriched with zinc.
- Sweet potato, corn and cassava enriched with vitamin A.
- Sorghum and cassava enriched with amino acids and protein.

Iron deficiency during childhood and adolescence impairs mental development and learning capacity. In adults, it reduces the ability to carry out physical work. Anaemia caused by iron deficiency increases women's risk of dying in childbirth.

Stunting is commonly used as a proxy to estimate the risk of **zinc deficiency** in a population. Approximately 23% of all children under 5 are stunted.

Vitamin A deficiency results in growth retardation, reproductive disorders, eye damage - and ultimately blindness. Over 19 million pregnant women in developing countries are vitamin A deficient, and 9.7 million are clinically night blind.



The benefits of nutrient-enriched crops

Systematic planning and research over the past two decades suggest that nutrient-enriched crops can raise essential nutrient content and offer a long-term solution to preventing micronutrient deficiencies.

This method achieves a sustained high nutrient content of local crops; the potential for improved crop resilience and productivity; and a way of effectively reaching the rural poor. Nutrient-enriched crops reach the poorest households through what they already grow and eat – food staples.

Perhaps one of the greatest advantages of conventional plant breeding is sustainability. Once a nutrient-enriched staple crop has been bred, adapted and grown, it becomes part of the food system and is, as such, perpetual.

"Strengthening national capacities in food fortification"

