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The Application of Biofortification as an Effective Method of Reducing Global Malnutrition

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The application of biofortification to staple crops as an effective method of reducing global malnutrition

By Bailey Illg & Jacob Scherber

Introduction

- Biofortification is the practice of improving nutritional quality of crops before or during the growing process.
- Intended to reduce malnutrition by providing additional necessary nutrients.
- Biofortification has the potential to reach rural parts of the world.
- It is considered one of the most cost-effective methods of improving nutrition.
- Can be done through selective breeding, genetic engineering, or agronomic application of nutrients.

Historical Development

- The green revolution increased the amount of food produced but lacked advances in nutritional content.
- In the 1990's, research shifted to producing foods with improved nutrient densities and high yield.
- Most of the early biofortification efforts focused on modifying crops through selective breeding.
- Improvements in genetic modification technology has made it more efficient.
- Biofortification has been mainly centered on improving nutritional accessibility in rural and developing countries

Current Status of Research

- Scientists can manipulate genes selecting for plant mechanisms to combat plant homeostasis and to understand desirable traits of crops for breeding.
- Selective breeding allows crops to be breed for desirable mechanisms and promotes beneficial plant varieties.
- Emphasis has been placed on improving crop bioavailability to use all nutrients.
- Direct application of nutrients is utilized to increase nutrient concentration.
- Application methods include fertilizer sprays on soil, foliage, plant seeds, or a combination of these methods.

Current Issues

- Low bioavailability for some biofortified crops lead to unused nutrients.
- Consumers and producers are hesitant to adopt biofortified crops due to differences in appearance and taste.
- Biofortification decreases genetic variation in crops and could lead to more susceptibility to diseases.
- Some biofortified nutrients have interacted with nontarget nutrients

Figure 1. Golden rice (shown on the right), an example of a successful biofortification technique to increase beta-carotene in rice. Beta-carotene helps reduce vitamin A deficiencies (image credit: Castro, 2019).

Conclusion & Recommendations

- Based on our research, we recommend that research continues in biofortification.
- We feel that biofortification is a viable solution to combating malnutrition and addressing a growing global population.
- More research is needed to determine how biofortified nutrients interact with other nutrients already present.
- Bioavailability should be emphasized in biofortification to maximize benefits.
- Regulations and laws should be passed to make biofortified crops more accessible.