Available online at
www.agrospheresmagazine.com

ISSN (E): 2582 – 7022

Agrospheres:e-Newsletter, (2022) *3*(2), 3-5

Article ID: 343

Enough to Eat: Biofortification A Prominent Strategy to Resolves Hidden Hunger Problems for Sustain Global Population

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Article History
Received: 15. 01.2022
Revised: 4. 02.2022
Accepted: 11. 02.2022

INTRODUCTION

Over population is an major concern at the global level due to immense population pressure; food insecurity and mall-nourishment have become an unprecedented challenge for humankind. The Green Revolution and related movements in India were focused on eradicating hunger from the country. As a result of the Green Revolution, the country has increased the production of food grains and is largely self-sufficient but not secure till date from appropriate micronutrient resulting malnutrition. Malnutrition like undernutrition, deficiency of essential nutrients, and over weight is affecting more than 2 billion people worldwide (Tulchinsky 2010). Despite having 'enough to eat', many people are not getting enough nutrients in their food basket, i.e. causes the problem of 'hidden hunger'. It is widely termed as "Hidden Hunger" can cause the risk of various infections and nutritional diseases and disorders. Due to malnutrition cause of many health disorders and it is an imbalance of needs and intake of nutrients and calories. Malnutrition is an actual issue and every third person in the world is suffering from it mainly caused by micronutrient deficiency (Fe and Zn). Anaemia and iron deficiency are problems pervading society especially the economically weaker sections and women. Biofortification is the most feasible way to fight against hidden hunger and malnutrition. It is a combination of best traditional practices and modern technology to produce micronutrient-rich staple food crops.

Biofortification: An overview

The process of increasing the concentration/amount of nutrients in the food crops using different methodology like agronomic, conventional selective breeding, or genetic engineering is known as biofortification. Biofortification differs from ordinary fortification because it focuses on making plant foods more nutritious (plants are growing), rather than having nutrients added to the foods when they are being processed.

There are various schemes and measures undertaken by the government to ensure that the population gets enough food intakes in terms of the calorific value with enough micronutrient. However, the current era of science focus on increasing the nutrient content of the food intake.

Biofortification approaches

1. **Agronomic approaches:** Agronomic biofortification is also named as mineral fertilization. In this way, fertilizers rich in nutrients are applied to plants and soil to increase the micronutrient concentration in the edible portion of plants (Carvalho and Vasconcelos 2013). It is a simple and immediate method to overcome the mineral deficiency problem in grains.
2. **Conventional breeding:** Evaluation and identified the genotypes with higher concentration of mineral (Fe and Zn) then cross with local cultivar and identify the superior progeny with higher amount of mineral. Conventional breeding leads to obtain efficient nutrient acquiring (accumulating) progeny can be result in the production of lines with efficient nutrient use efficiency or fortified with required nutrients (Nestel et al 2006).
3. **Genetic engineering:** In the genetic modification technique, a specific genetic trait is taken from the donor organism and transferred to the recipient organism (plant) that shows this trait afterwards. This technique is considered beneficial compared to the conventional breeding technique because it takes a very short time to produce a crop having traits of our interest and can transfer specific genes. Golden rice is one of the best examples of genetically modified crops (Potrykus 2001).

Success of biofortification

The following are some common examples of biofortification of food crops:

- Iron biofortification – Rice, sweet potato, beans, legumes, cassava
- Zinc biofortification – Rice, wheat, sweet potato, maize, beans
- Provitamin A carotinoid biofortification – Cassava, maize, sweet potato
- Amino acid and protein biofortification – Cassava, sorghum

Challenges of biofortification

Due to the colour changes in the grain, people hesitate to accept biofortified food as in the case of normal grain for example golden rice. Farmers are facing marketing of the biofortified crops and they not adopt at large scale. The initial costs also could be a barrier for people to implement biofortified crops.

Advantages of Biofortification

- Biofortification helps in achieving overall health improvement in the people.
- Biofortified crops are more resilient to diseases, pests, droughts and provide good yield.
- It offers a food-based, sustainable and low-dose alternative to iron supplements.
- It has the potential to reach the poorest section of society (who cannot afford food supplements) and will also benefit farmers.
- It is highly cost-effective since once the initial research is done, the process can be easily replicated and scaled at global level.
- In a country such as India, that faces huge nutritional challenges, biofortification is a sustainable, cost-effective method that can help resolve this challenge.

CONCLUSION

Micronutrients are essential for human growth and development, and their deficiency is a major concern at worldwide. In recent years, significant progress has been made with the release of several biofortified crop varieties that are helping to overcome micronutrient deficiencies and resolve the hidden hunger problems in the target populations. Biofortification to improve the nutritional profile of crops has gained momentum in the past decade. However, there are several

challenges ahead that need to be addressed if the use of biofortified foods is to be successfully maximized.

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