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Biofortification: Ensuring Freedom from Hidden Hunger

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INTRODUCTION

Energy deficit in developing countries is a common issue and have been observed in the past decades. One in nine people in the world are still suffering from hunger, but the prevalence of undernourishment has decreased from 18.6% in 1990–92 to 10.9 in 2014–16, according to the Food and Agriculture Organization (FAO) % (FAO, 2015). Despite this development, one in three people worldwide, or more than 2 billion people, suffer from micronutrient deficiency, popularly known as hidden hunger. Growing children are more likely to experience the effects of malnutrition as compared to adults because their dietary needs change with different stages of growth and development. In the past 15 years, a new strategy referred to as biofortification has emerged as an effective addition to traditional methods for addressing micronutrient deficiency and associated health issues and hidden hunger. Breeding staple food crops to boost their micronutrient content is known as biofortification, and it often targets foods that are commonly consumed by low-income families around the world.

Status of Malnutrition in India

According to the Global Nutrition Report 2018, India has 46.6 million stunted kids, which is a third of the global total. Nearly half of all under-5 child mortality in India is attributable to undernutrition. According to the Global Hunger Index (GHI) 2018, India was rated 103rd out of 119 nations, while the global hunger rate decreased from 29.2 in 2000 to 20.9 in 2018. Due to severe malnutrition, 43 % of children under the age of five in India are stunted and 43 % are underweight (3 out of every 10 children are stunted). Poor neurological function, impaired vision, hypertension, weakened immunity, food allergies, diabetes, rashes, thinning hair, and leaky gut are just a few of the health problems caused by micronutrient deficiencies. These deficiencies are primarily the result of a diet that is poor in quality and deficient in proteins, vitamins, and minerals.

The rising cost of non-staple items is one of the major factors for decreasing dietary quality. Agriculture-based food products are the main source of nourishment in underdeveloped nations. The green revolution's primary focus, however, was on guaranteeing food security rather than food quality. In the fight to increase production to feed a growing population, we somehow failed to keep our produce's nutritious quality high.

What is Biofortification.?

The process of "biofortification" involves the enhancement of nutrient density of food crops using traditional plant breeding, better agronomic techniques, and/or contemporary biotechnology without sacrificing any crucial qualities that customers or peasants value (Saltzman et al., 2016). It is viewed as an intervention in nutrition-sensitive agriculture that lowers vitamin and mineral deficiencies. Other than quality upgrade, micronutrient provides additional benefits like yield increment, biomass improvement and disease reduction in micronutrient deficit soils. A healthy balanced diet must include protein, vitamin, dietary fibre and minerals in an adequate amount.

Need for Biofortification

Biofortification of staple crops is a practical way to reach the vast majority of rural poor people dispersed around the world. After the initial investment, ongoing expenses are very low. A sustainable way to reach tens of millions of people is through the biofortification of basic crops. Several biofortified crops, including provitamin A-rich OSP, provitamin A yellow cassava, provitamin A orange maize, iron bean, iron pearl millet, zinc rice, and zinc wheat, have been released in more than 30 countries and are being tested and farmed in more than 40 nations now. (As in the following table).

Few examples of biofortified crops and their respective dates and countries of release

S.No.	Crop	Country	First Year(s) of release
1	Provitamin A Sweet potato	China, Uganda	2001, 2004
2	Provitamin A Cassava	Nigeria, Democratic Republic of Congo	2008, 2011
3	Provitamin A Maize	Zambia, Nigeria, Ghana, China	2012, 2012, 2012, 2015
4	Iron Cowpea	India	2008
5	Iron Pearl millet	India	2012
6	Zinc Rice	Bangladesh	2013
7	Zinc Wheat	India	2014
8	Iron Beans	Rwanda, Democratic Republic of Congo	2010, 2011
9	Iron and Zinc lentils	India, Nepal, Bangladesh	2012, 2013, 2013

Organizations Working for Biofortification

The first company to develop and disseminate high-quality staple food crops is "Harvest Plus". It is an international initiative that works with scholars, NGOs, the public and private sectors, and is active in over 60 countries. In order to develop nutrient-dense, biofortified crops, it collaborates with a number of other organisations, including the World Health Organization (WHO),

International Centre for Tropical Agriculture (CIAT), International Rice Research Institute (IRRI), International Institute for Tropical Agriculture (IITA), National Agricultural Research and Extension Systems (NARES), and Consultative Group on International Agriculture Research (CGIAR). To address the issue of malnutrition in poor countries, collaborative international transdisciplinary initiatives are necessary.

Merits

Biofortification is based on the food practises of a poor household. The most economically disadvantaged people are included, those who reside in remote, rural areas without access to or money for commercially promoted nutritious food sources. Regardless of whether people start thinking about anything, farmers continue to raise and consume their biofortified crops, which are now regarded as harvests. It generates greater profits while posing no threat to the ecosystem. It is a one-time endeavour to generate seeds that revitalise themselves, keeping sporadic expenses low and allowing for the global exchange of germplasm, the live tissue from which plants can be developed.

CONCLUSION

Currently, it is anticipated that a direct route to better nutrition will yield significant cost benefits. There is an urgent need to ensure food security, promote nutrient intake, and respond to dietary recommendations. Therefore, several measures should be implemented to address the problem of malnutrition in a coordinated manner. Devoted scholars from all disciplines should conduct a thorough evaluation of the continuing burden of inadequate dietary intake. A sustainable and independent method is biofortification. One sustainable method to improve the nutritional profile of food crops is biofortification. Over the past ten years, this method has grown in significance and been included into numerous breeding programmes. Specifically, zinc, iron, iodine, selenium, carotenoids, and folates have been targeted as important micronutrients. In conclusion, it can be said that biofortification appears to be an effective method for reducing malnutrition and covert hunger in the targeted populations. Along these lines, indeed, we can reason that we can take care of the world through biofortification and tomorrow we can envision a world liberated from hidden hunger.

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