AGRIALLIS
Science for Agriculture and Allied Sector: A Monthly e Newsletter
Volume 2 – Issue 12
Online ISSN: 2582-368X
www.agriallis.com

IS ACHIEVING ZERO HUNGER BY 2030 APPROACHABLE? *A CRITICAL ROLE OF AGRICULTURE AND ALLIED SECTORS*

Article Id: AL202122

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To have access to safe food is a human right". Although there are enough food, knowledge and resources for all, every ten seconds, a child dies of hunger, and according to WHO (2020) estimates 690 million people went hungry in 2019. The more hunger and malnutrition increases as seen in the post-pandemic scenario, achieving the goal zero hunger by 2030 seems to be unreachable(UN report). So the sensible way to cater to this problem could be to provide nutritious diets/ food in the form of innovative nutrition and health programmes to the billions saving, in turn, trillions of expenditure on health. The number of vulnerable populations suffering from hidden hunger (micronutrient deficiencies) is increasing at an alarming rate every year and has reached more than 2 billion residing mostly in poorer countries. This is caused by a lack of critical micronutrients like vitamin A, zinc, and iron in the daily diet. Hidden hunger impairs the mental and physical development of children and adolescents and can result in lower IQ, stunting, and blindness; women and children are especially vulnerable. Among adults, it has severe effects on productivity, work, mental wellbeing and physiological conditions.

Asia (381 million) and Africa (250 million) remains to be the home for the greatest number of undernourished in the world. The major reasons are the high cost of nutritious foods and low affordability of healthy diets for the vast majority of populations living in these continents. The current scenario of COVID-19 pandemic is further intensifying the vulnerabilities and inadequacies of global food systems affecting all the activities related to the production, distribution and consumption of food globally. It is estimated that at a minimum, another 83 million people, and possibly as many as 132 million, may go hungry in 2020 as a result of the economic recession triggered by the pandemic.

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What options are available in Current Scenario?

Multiple options like food supplements, such as micronutrient-rich capsules or food products fortified during processing exist, but the low purchasing power of the poor, lack of better infrastructure, efficient technology, and a reliable distribution system makes it an unattainable option. Implementation of efficient information, education, and a communication program motivating consumers to change their food habits in favour of nutrient-rich foods may also be an option, but this is costly and time-consuming. Consumption of diversified diets may appear to be another sustainable option to control malnutrition, but this doesn't seem to be possible in the short term as it will require a change in people's food habits and preferences.

Improving Nutrition through Biofortification

The main source for food production is agriculture, that is where from we get nutrients necessary for a healthy life, but agricultural policies and technologies have focused mostly on improving profitability at the farm and agro-industry levels rather than improving nutrition status of the population. With the increasing prevalences of hidden hunger, there is a growing interest in the role agriculture plays in improving nutrition, in particular by paying more attention to the nutritional quality of food. Biofortification seems to be a potential way. It is a scientific method for improving the nutritional value of foods already consumed by those suffering from hidden hunger. Agricultural breeders have a major role in providing the common populations with the availability of improved crops (seed, tuber, or roots, for example) with increased nutritional value. Malnourished communities receive these biofortified crops to grow and eat through several community development programmes. If available and consumed regularly, our body gets higher amounts of essential micronutrients, but it also depends upon the level of absorption of our bodies. With a one-time R&D investment, biofortified seeds could spread through the existing seed distribution systems.

Government initiatives, like the Pradhan Mantri Matru Vandana Yojana maternity benefits program, POSHAN Abhiyan (National Nutritional Mission), and other schemes, namely, the Integrated Child Development Services, Mid-Day Meal Scheme, and the National Food Security Act are well-intentioned and have been able to provide food to people to survive. However, the recent GHI ranking of India shows that providing just-food is not

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enough, rather we need to cater and solve the issue of hidden hunger. Here, biofortification offers a reasonable option to deal in such a situation

Process of Bio Fortification

Plant breeders explore the full spectrum of crop genetic diversity, especially seed banks, to first identify nutrient-rich germplasm, or lines, of food crops that can be used to breed more nutritious varieties. However, the whole process requires the involvement of experts from multiple fields. Nutritionists must determine the additional amount of a nutrient a food crop must provide to measurably improve nutrition when that crop is harvested, processed or cooked, and eaten. To do so, nutritionists must account for

1. Nutrient losses after the crop is harvested (nutrients can degrade substantially during storage, processing, or cooking).
2. The amount of the nutrient that the body actually absorbs from the food (bioavailability).
3. The amount of staple food actually consumed on a daily basis by age and gender.

Advantages of Bio-fortification

Dietary diversity is an ultimate long-term solution to minimizing hidden hunger. Biofortification can be effective in reducing hidden hunger as part of a strategy that includes dietary diversification and other interventions such as supplementation and commercial fortification. Biofortification has four main advantages when applied in the context of the poor in developing countries.

1. First, it targets the poor who eat large amounts of food staples or starchy foods daily.
2. Second, biofortification targets rural areas where the majority of the poor live mostly as subsistence or smallholder farmers, or landless labourers. Despite urbanization and income growth associated with globalization, diets of the rural poor are still heavily based on the staple and starchy foods like cereals and tuber crops in many regions. Expected increases in food prices, exacerbated by climate change, are likely to increase this reliance on staple foods.

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3. Third, bio-fortification is cost-effective. After an initial investment in developing biofortified crops, those crops can be adapted to various regions at a low additional cost and are available in the food system, year after year.
4. Fourth, because this strategy relies on foods people already eat habitually, it is sustainable and later on the developed seeds, roots, and tubers can usually be saved and shared with others in the farming communities. Once the high-nutrition trait is bred into the crops, it is fixed, and the biofortified crops can be grown to deliver better nutrition year after year—without recurring costs.

Biofortification: Limitations and Challenges

It is promising but still possesses certain limitations and challenges as well.

1. First, biofortification requires a paradigm shift. Agricultural scientists need to add nutrition objectives to their breeding programs, in addition to standard goals such as productivity and disease resistance and work closely with Nutritionist. Health care professionals also need to accommodate agriculture-based approaches to clinical interventions and increase their collaboration with agricultural experts.
2. Second, biofortification will be widely adopted only when proponents show these new foods improve nutrition. Most biofortified crops are still in the development pipeline. However, one biofortified staple food crop that has been successfully released is the orange (or orange-fleshed) sweet potato. As more crops will be released, nutritionists will be able to build a body of evidence that biofortification is the viable agriculture-based intervention to improve nutrition.
3. Third, the amounts of nutrients that can be bred into these crops are generally much lower than that can be provided through fortification and supplementation. However, by providing 30–50 per cent of the daily nutrient requirement, biofortified crops can significantly improve public health in countries where hidden hunger is widespread.
4. Fourth, nutritionists now focus on the -9-to-24-month age group, when micronutrients are crucial for healthy development. Infants consume relatively low amounts of staple foods and yet have relatively higher micronutrient requirements, making bio fortification's contribution to micronutrient adequacy in this group limited. There are exceptions; due to particularly high vitamin A

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content of many OSP varieties, regular consumption of these by the mother could contribute substantially to vitamin A intakes of breastfed children (6–23 months of age).

Conclusion

Innovation and investment are the main tools to address the three main challenges (wastage, sustainability and nutrition) of today's food industry in feeding the populations of future and approach towards the goal of zero hunger. Upcycling food waste, application of supply chain technologies (shelf life extension, use of food additives), digital land mapping, biological and microbial-based solutions for sustainability, personalised nutrition, production of healthier food products biofortification and proper food distribution mechanism if worked upon altogether has a potential to mould our agricultural system towards nutrition adequacy which eventually leads to healthier populations.

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