

## Can Bio-fortified crops battle against country's hidden hunger malnutrition?

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### Introduction

Hidden hunger, or micronutrient deficiency, is a leading global problem. Prime Minister Narendra Modi released 17 bio-fortified varieties of eight crops this month of October on World Food Day, which can increase the nutritional value of food staples three-fold. The rice varieties with high zinc, wheat varieties rich in protein, iron and zinc, and maize, mustard, and groundnut varieties rich in multiple micronutrients were released with the hope of transforming the 'Indian *thali* into a nutri *thali*'. The emphasis on bio-fortification is a step forward for India's transition from food availability and access to nutrition security and eradicating hidden hunger. The Modi government also wants to make fortification of rice mandatory in the next three years to tackle anemia.

Annually, India loses nearly Rs 6 lakh crore in GDP due to micronutrient deficiencies in addition to the loss of employment days and productivity due to illness, according to a Current Developments in Nutrition report.



## **Boundless Epidemic malnutrition**

India ranked 94 among 107 nations in the Global Hunger Index (GHI) 2020, and is in the “serious” hunger category along with Bangladesh, Myanmar and Pakistan as per a joint report of Welthungerhilfe and Concern Worldwide. The GHI is calculated based on the percentage of undernourished population, children suffering from wasting and stunting, and child mortality. About 14 per cent of the Indian population is estimated to be undernourished. India also has one of the highest stunting rates (37.4 per cent) and wasting rates (17.3 per cent) among children.

Wasting means ‘children who have low weight for their height, reflecting acute under nutrition’. Stunting means ‘children who have low height for their age, reflecting chronic under nutrition’.

## **Requirement of food nutrition-based production and marketing channelization**

Although India has released bio-fortified varieties for major crops, these leading to improved health of consumers are a long-drawn and difficult process, involving multiple steps and stakeholders. For example, past experience shows that although the first bio-fortified staple crop ‘Golden Rice’ was developed by 1999 to tackle Vitamin A deficiency, its adoption has still not picked up due to difficulties in consumer acceptance, marketing and getting a premium price, according to the Science Magazine. The only exception in India was the adoption of bio-fortified pearl millet varieties rich in zinc and iron in Maharashtra. So, before checking out plans for wider adoption of these varieties, the Modi government has to probe why past experiments didn’t pick up in majority of the cases, what the possible pitfalls are and how we can overcome implementation problems by answering the right questions.

### **Are there any advantages from bio-fortified crops to food growers?**

The PM Modi has issued a Commemorative Coin of Rs. 75 and dedicated 17 bio-fortified varieties of 8 crops to the nation on the occasion of 75th Anniversary of the Agriculture and Food Organization (FAO), the United Nations. The bio-fortified varieties are 1.5 to 3.0 times more nutritious than the traditional varieties. The rice variety CR DHAN 315 has excess zinc;

the Wheat variety HD 3298 is enriched with protein and iron while DBW 303 and DDW 48 are rich in protein and iron.

The Maize hybrid varieties 1, 2 and 3 are enriched with lysine and tryptophan, the Finger varieties of Millet CFMV 1 and 2 are rich in calcium, iron and zinc. The CCLMV1 variety of Small Millet is rich in iron and zinc. The Pusa Mustard 32 is enriched with low

Araucic Acid, while Girnar 4 and 5 varieties of Peanuts are rich in increased Oleic Acid and Yam's Shri Neelima and DA 340 varieties are enriched with Anthocyanin. These new bio-fortified crops can be directly fed into India's ambitious POSHAN Abhiyaan targeting over 10 crore people with the aim to reduce stunting, under nutrition, anemia, and low birth weight. Biological fortification of food has proven to be simple, cost-effective and sustainable.

To reach middle-class and poor consumers, awareness building through large-scale campaigns by government organizations as well as demand-pull mechanisms through public procurement and distribution is crucial. The poor can benefit enormously if these varieties are incorporated into already existing supply chains such as mid-day meals for school children, distribution through Anganwadis under Integrated Child Development Services (ICDS) scheme, food distribution in government hostels and hospitals, and the Public Distribution System (PDS), which have enormous potential of reaching almost 100 per cent of the undernourished and poor.



Prime Minister Narendra Modi, dedicated to the nation 17 recently developed bio-fortified varieties of eight crops on World Food Day. He said that, "This year's Nobel Peace Prize being awarded to the World Food Program is a big achievement and India's contribution and association with it has been historic."



### **Is supplement of seed materials a Troubleshoot?**

Development of bio-fortified varieties with higher micronutrients is not enough, there needs to be sufficient production of seeds for distribution among farmers. To meet this, government agencies such as the National Seed Corporation have to take up a bigger role. In addition, the development of innovative ecosystems by forming seed-supply consortiums with all stakeholders, including bio-fortification scientists, seed production companies and farmer producer organizations, is essential for supply in sufficient quantity and quality. The breeder seed can be channelled through existing village seed programmes and seed hub projects for seed multiplication and distribution among farmers without additional cost.

A minimum standard of nutritional content needs to be set for varieties to be released into the seed production process. This will facilitate replacement of low nutritive seeds with bio-fortified seeds in the supply chain. The Union Ministry of Agriculture and Farmers' Welfare will need to step in for the promotion of bio-fortified seeds through public seed-production agencies at the state level so that seeds with low-nutritive value are not accepted by the state.

### **Are these bio-fortified crops beneficial to growers?**

The cultivation of bio-fortified crop varieties fetches premium prices, if they are differentiated from the conventional varieties. The recently enacted liberalized contract-farming law and government encouragement to Farmer Produce Companies (FPOs) are handy for the production and marketing of bio-fortified crops. But, it requires collaboration among all stakeholders, starting from the research stations, seed multiplication and distribution companies, mega-retail chains and farmers to market brands.

In this eco-system, farmers can get cheaper seeds and technological assistance from private companies along with buyback arrangements for produce at premium rates. The location-based and crop-specific business plans need to be developed together by research stations, government, private firms and farmers to maximize consumer satisfaction. This can also increase the share of farmers in the consumer rupee, as was done with Basmati rice of the Indian Agricultural Research Institute and Sorghum varieties of ICRISAT. However, in the absence of trait-specific price premium between bio-fortified and conventional grain, it is the

inclusion of superior agronomic traits like yield, taste and look that matter because profitability hinges on them. For these food grains, announcing higher Minimum Support Price (MSP) and procuring at designated procurement canters after authenticating the variety from the local agricultural officer is a way forward.

### **Do firms and networking support systems subsist for process of commercialization towards globalization?**

The inability to differentiate bio-fortified products from conventional products often stands in the way of the farmers getting any premium in the market and, therefore, certification mechanisms are needed. Some studies indicate that in countries like Kenya, Brazil, Mozambique and New Zealand consumers are willing to pay a significant price premium for bio-fortified food products compared to conventional food products, ranging from 8 per cent to 50 per cent higher, if the product is differentiable like Golden Rice. Similarly, provision of health-related information on the packages of bio-fortified grains will fetch higher prices than conventional grains.

Emerging supermarkets and farmer producer companies play a big role in ensuring that branded food products find their way to consumers. But they mostly reach rich consumers, who can afford them.

Bio-fortified crops with visible traits like Golden Rice (yellowish grain) are easily distinguishable from the normal white rice. While crops with invisible nutrient traits, like iron-rich pearl millet, may not be differentiable, making branding and marketing difficult. For these products, marketing with trustworthy food companies with high-brand equity can help. A greater understanding of how the drivers of acceptance of invisible traits differ from that of visible traits is a precondition for the produce effectively reaching consumers. India has a long way to go before bio-fortified crops make it to all our plates. But it's an important step for both our farmers and the fight against malnutrition and hidden hunger.