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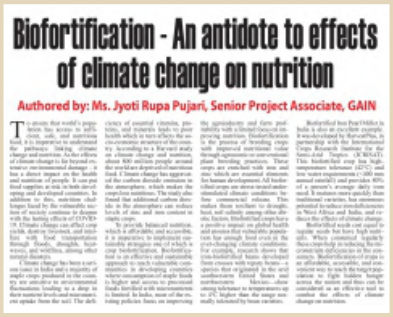

Biofortification - An antidote to effects of climate change on nutrition

Authored by: Ms. Jyoti Rupa Pujari, Senior Project Associate, GAIN

Nutrition Smart Agriculture:

Need of the hour to tackle malnutrition in India

According to the Food and Agriculture Organization report 2019, around 26% of the global population experiences moderate to severe levels of food insecurity and lacks regular access to nutritious and healthy food. Though, India has been a food abundant country for the last few decades now, nutritional insufficiency is still prevalent, which collectively affects the health of billions of people. One of the greatest threats to humankind is the hidden hunger caused by multiple micronutrient deficiencies. The fundamental purpose of any agricultural system should be to nourish people and provide them with all the nutrients needed for their well-being. We need to re-envision agriculture as the primary source of sound nutrition through the food people harvest and eat. The need of the hour is to ensure multi-pronged approach combining agriculture, health and nutrition sectors.

In addition to educating and sensitizing the vulnerable communities and encouraging behavioural change, they should be encouraged to adopt smart farming practices. The entire idea of nutrition sensitivity is premised on how nutrition can be included in govt. policies and programs, building on agriculture, behavioural change, women empowerment, partnerships etc. Nutrition sensitivity alone is not enough. Nutrition sensitive agriculture and nutrition smart agriculture should go hand in hand and complement each other. Nutrition smart agriculture as an approach has dual objectives, the first one is to improve human nutrition and the second being better productivity and income at the level of farm and agribusiness. The way forward is to promote and support policies and programs that improve rural livelihoods while creating a positive impact on nutrition.

As food prices continue to increase, low-income households tend to depend on staples for most of their nutritional requirements as they are comparatively cheap and less perishable. The lack of essential vitamins, minerals and proteins in staples makes them vulnerable to serious health disorders. The efficacy of 'Nutrition-smart agriculture' depends on adequate nourishment through food, access to health care, and suitable childcare practices. Nutrition smart agriculture should be the way to approach the policy and program reforms for the food system. **Nutrition smart agriculture** offers abundant opportunities to tackle the problem of malnutrition by striking a balance between sustainable agriculture, improved health status, and better nutrition which will help in achieving important SDG milestones.

One of the ways for a nutrition smart and climate-sensitive approach is the biofortification of staple food crops. Biofortified crops offer a sustainable, cost effective and proven technology in which staples are bred to incorporate essential vitamins and minerals. They need to be adopted at scale to improve the availability and affordability of nutrient rich foods in rural communities. Steps should be taken by policy makers and the government to include biofortified crops in safety net programs such as ICDS and mid-day meal, in addition to encouraging food fortification and supplementation.

The Nutrition Smart Village Program launched by the Union Government in 2021 aims to reach out to 75 villages and address this challenge and achieve the goal of malnutrition free India. The objective of the initiative is to promote nutritional awareness and bring behavioural change in the rural areas of the country with a focus on farm women and school children by harnessing traditional knowledge and implementing homestead agriculture and nutri-gardens. Similarly, integrated programs that focus on agriculture and nutrition need to be designed to diversify diets and ensure better nutritional outcomes for a sustainable and healthy future.

Reflections ...

> Nutrition smart agriculture is fundamentally a need of an hour as it directly impacts people's nutrition, especially the most vulnerable ones. Policies to strengthen nutrition smart agriculture should be ranked higher as it will help to build the block of food systems that promote healthy people, a healthy planet, and healthy economies.

Supreet Kaur
Senior Policy Advisor, GAIN

> Nutrition-Smart agriculture can play an important role in transforming local food systems sustainably. Scaling nutrient-rich biofortified crops, with multi-stakeholder partnerships can provide a springboard for transformational solutions for nutrition security.

Binu Cherian
Country Manager, HarvestPlus

Success Story of Agri-Entrepreneur

Improving nutrient intake and rural livelihoods through adoption of biofortified wheat

Radhika Prasad Verma is one of the six agricultural entrepreneurs who distributed zinc biofortified wheat seeds to farmers under the Commercialisation of Biofortified Crops (CBC) project in Kudraha block, Basti district of Uttar Pradesh, India. He is a certified Agri Entrepreneur (AE) who has received 35 days of training in agriculture and allied sectors and has a good understanding of best agricultural practices. Being associated with Agri Entrepreneur Growth Foundation(AEGF), he keeps up with latest agricultural trends and is considered as a lead farmer in his area. So when he first came to know about biofortified varieties and the nutritional benefits of Zinc for human health, he was excited and open to adopt the biofortified Zn wheat variety. He was also able to convince 116 farmers in his locality to grow the same variety. According to him, though the sowing of BHU 25 was a bit delayed, the germination percentage and vegetative growth of the plants were comparable to the other conventional varieties in the region. Yield of wheat this year was adversely affected owing to the heatwave and rise in temperature towards the end of March. Nevertheless, the yield of zinc biofortified wheat was comparable with the other varieties and the farmers were happy with the overall performance of biofortified wheat.

As an AE, he has educated fellow farmers on the importance of Zinc in diet and the benefits of biofortified crops. He also trains farmers on the varietal characteristics of BHU-25 and the package of practices for the best results. He also advocates the consumption of biofortified wheat within rural households by distributing the produce among family and relatives and by self-consumption. As part of the program, Radhika Prasad also received training on checking and ensuring quality parameters like moisture percentage, foreign material and inert material for better marketability of wheat grains to processors/millers. He took the lead in imparting the same to fellow farmers which enabled the farmers to negotiate better prices. Moreover, he took the initiative to aggregate and segregate zinc wheat by taking special precautions to not mix it with any other variety. With the help of the CBC programme, he was able to market 10 MT of zinc wheat to Balaji Flour Mill, Basti. According to the processor, the quality of flour and bread *(roti)* made from Zn enriched wheat was better than the conventional wheat. Balaji Flour mill has expressed their interest in procuring more zinc wheat and also, in paying a premium if needed. Radhika Prasad and his fellow farmers are excited to grow this variety of biofortified wheat again in the next season. He also plans to onboard more farmers and offer better services to them, which in turn would improve the livelihood and nutrition of the farmers associated.

OPERATIONAL MODEL OF AGRI ENTREPRENEUR (AE)

The Agri Entrepreneur (AE) model is a decentralized approach in empowering the rural youth and incentivizes them to play an active role in agricultural development in their region. An AE brings together services such as credit and market linkage, access to high-quality input, and crop advisory for a cluster of about 150-200 farmers. The Agri-Entrepreneur model is a flagship initiative of Syngenta Foundation India (SFI). They are also involved in extension activities and farmer mobilization through community level meetings. GAIN and HarvestPlus in partnership with SFI has leveraged this AE network, where these Agri Entrepreneurs are the focal points for biofortified seed distribution, input supply, regular training and capacity building for the farmers. These AEs also aggregate the biofortified grain produced and supply the same to millers and processors.

Highlights GAINed...

In Conversation with the Programme Lead at GAIN

Ishank Gorla, Programme Lead at GAIN

GAIN's mission is to advance nutrition outcomes by improving the consumption of nutritious and safe food for all people, especially the most vulnerable to malnutrition. By understanding that there is no "one-size-fits-all" way of dealing with the problem of malnutrition, GAIN focuses on developing alliances and building tailored programmes using a variety of models and approaches.Krishi Jagran interacted with Ishank Mikhail Gorla, who is the Programme Lead at GAIN leading the Commercialisation of Biofortified Crops Programme.

READ MORE https://krishijagran.com/interviews/in-conversation-with-the-programme-lead-at-gain/

GAIN presented on Biofortification, and our programme on the commercialisation of biofortified foods at the 7th Annual Nutrition Summit 2022. The objective of our talk was to sensitise the industry on biofortification, updates on policy and environment in India and most importantly intrigue the private players – SMEs and larger businesses - for adopting biofortified foods as a product offering.

The industries found it to be a novel and emerging area as some of the industries expressed their desire to work with GAIN on a pilot scale. What is interesting to note is that coming from GAIN, an organization that has advocated for fortification for so long in India, the industry had a level of trust and confidence in GAIN, for a new strategy – to address malnutrition, and a viable commercial opportunity for them to work on.

Biofortification - An antidote to effects of climate change on nutrition

Authored by: Ms. Jyoti Rupa Pujari, Senior Project Associate, GAIN

To ensure that world's population has access to sufficient, safe, and nutritious food, it is imperative to understand the pathways linking climate change and nutrition. As the effects of climate change is far beyond extensive environmental damage - it has a direct impact on the health and nutrition of people. It can put food supplies at risk in both developing and developed countries. In addition to this, nutrition challenges faced by the vulnerable section of society continue to deepen with the lasting effects of COVID-19. Climate change can affect crop yields, destroy livestock, and interfere with food transportation through floods, droughts, heatwaves, and wildfires, among other natural disasters.

Climate change has been a serious issue in India and a majority of staple crops produced in the country are sensitive to environmental fluctuations leading to a drop in their nutrient levels and micronutrient uptake from the soil. The deficiency of essential vitamins, proteins, and minerals leads to poor health which in turn affects the socio-economic structure of the country. According to a Harvard study on climate change and nutrition, about 800 million people around the world are deprived of nutritious food. Climate change has aggravated the carbon dioxide emission in the atmosphere, which makes the crops less nutritious. The study also found that additional carbon dioxide in the atmosphere can reduce levels of zinc and iron content in staple crops.

To provide balanced nutrition, which is affordable and accessible, it is imperative to implement sustainable strategies one of which is crop biofortification. Biofortification is an effective and sustainable approach to reach vulnerable communities in developing countries where consumption of staple foods is higher and access to processed foods fortified with micronutrients is limited. In India, most of the existing policies focus on improving the agroindustry and farm profitability with a limited focus on improving nutrition. Biofortification is the process of breeding crops with improved nutritional value through agronomic or conventional plant breeding practices. These crops are enriched with iron and zinc which are essential elements for human development. All biofortified crops are stress-tested understimulated climate conditions before commercial release. This makes them resilient to drought, heat, soil salinity among other abiotic factors. Biofortified crops have a positive impact on global health and ensures that vulnerable population has enough food even in the ever-changing climate conditions. For example, research shows that iron-biofortified beans developed from crosses with tepary beans—a species that originated in the arid southwestern United States and northwestern Mexico—show strong tolerance to temperatures up to 4°C higher than the range normally tolerated by bean varieties.

Biofortified Iron Pearl Millet in India is also an excellent example. It was developed by HarvestPlus, in partnership with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). This biofortified crop has high-temperature tolerance (42°C) and low water requirements (<400 mm annual rainfall) and provides 80% of a person's average daily iron need. It matures more quickly than traditional varieties, has enormous potential to reduce iron deficiencies in West Africa and India, and reduces the effects of climate change.

Biofortified seeds cost equal to regular seeds but have high nutrients. When consumed regularly these crops help in reducing the micronutrient deficiencies in the consumers. Biofortification of crops is an affordable, accessible, and convenient way to reach the target population to fight hidden hunger across the nation and thus can be considered as an effective tool to combat the effects of climate change on nutrition.

Article on Biofortification-An antidote to effects of climate change on nutrition appeared in Yugmarg. The article talks about the impact of climate change on the health and nutrition of people. Additionally, it focuses on ending poverty, ensuring food security and good health which is in line with GAIN's goal of attaining nutritional security in India.

Sights from the field...






India is the second largest producer of wheat with around 14.14 % of total world production. Major wheat growing states in India are Uttar Pradesh, Punjab, Haryana, Madhya Pradesh, Rajasthan, Bihar and Gujarat. India's wheat production stood at 109.59 million tonnes in the 2020-21 crop year of which Uttar Pradesh contributed 35.5 million tonnes accounting for 32.42% of all India production. Farmers prefer growing wheat when compared to other rabi (winter season) crops due to its relatively stable yield and increase in minimum support price. 80 % of the wheat produced in India is used for domestic consumption and 12-15 % is used to produce processed food products. Recent studies suggest that there has been an increase in the daily per capita availability of wheat across India from 168 g (2015) to 183 g (2021).

Wheat has a high dietary share and contributes to more than 50% of calories to the staple Indian diet. Biofortification provides a promising avenue for incorporating higher levels of micronutrients directly into key staple foods. Daily intake of zinc enriched wheat can provide up to 50% of daily zinc needs. Commercialization of Biofortified Crops (CBC) program jointly undertaken by GAIN and HarvestPlus is involved in scaling up the cultivation and consumption of Zinc enriched wheat in the states of Uttar Pradesh, Bihar and Punjab. The CBC programme utilises the existing value chain actors including seed multipliers, farmers, aggregators, processors and retailers to catalyse commercial markets for biofortified seed, grain and food products.

In the rabi season of 2021, GAIN and HarvestPlus facilitated handholding support to farmers growing Zinc enriched wheat by associating with on-ground implementing partners including Self Help Groups (SHGs) and Farmer Producer Organizations (FPOs). Support was extended to farmers through capacity building, seed distribution, on-farm advisories, grain aggregation, and assured market linkages for marketable surplus of zinc wheat. The photos presented above are from the zinc wheat fields in the districts of Bahraich, Balrampur and Shravasti in Uttar Pradesh. Farmers reported that the productivity of these biofortified varieties is at par with other conventional varieties The wheat fields are harvested when ready and the harvested produce are bundled. The wheat stalks are then threshed and winnowed to separate the chaff and grains. After harvest, special care is taken to pack the zinc wheat grains in specially designed bags to prevent mixing with the other conventional varieties. They are then marketed to identified millers/processors in the locality for processing and value addition.

Quote from the Agri-Entrepreneur...

"Earlier as a trained Agri-Entrepreneur, I was selling inputs (seeds, fertilisers etc) to farmers in my area. But now with CBC programmes, in addition to supply of zinc wheat seed to farmers, I also ensured market linkage of surplus grains to the farmers. This in turn has led to improving my credibility in the community and my input business has also grown."

Radhika Prasad Verma, AE, Basti, Uttar Pradesh

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