BIOFORTIFICATION:

NUTRITION INVESTMENT ON HUMAN HEALTH

Antul Kumar, Anuj Choudhary and Harmanjot Kaur

Department of Botany, Punjab Agricultural University, Ludhiana

INTRODUCTION

Hunger and poverty are the two sides of same coin, and every nation is facing many challenges to overcome this problem. Hidden hunger or malnutrition hits worldwide population, especially in the developing and poor countries with same pace. A fall in ranking in the Global hunger index has created a prudent task to accept reality, even after the 72 years of India's Independence. On the occasion of World food day, Hon'ble Prime Minister of India, Shri Narender Modi releases 17 biofortified varities of staple and non-staple food crop. Biofortification varieties of rice CR Dhan 315, wheat HI 1633, Wheat HD 3298, Wheat DBW 303, Wheat 4098, Maize LQMH-1, Maize LQMH-2Maize LQMH-3, Finger Millet-CFMV-1, Finger Millet- 2, Little millet-1, Mustard PM-32, Ground nut: Gimar -4, Ground nut-Gimar -5, Yam-DaSree & Yam-DaNeelima, Yam- Da 340 are released on such occasion.

Biofortification, the enhancement of nutrients levels in crop plants through various conventional and modern agricultural techniques, is advocated as a most efficient way to eradicate the problem of hidden hunger. The revolution for nutrition is targeted empty calories, vitamins, minerals to cope up the challenge of hidden hunger, even we consume food in adequate amount. This invisible hunger from staple crops hits the entire world, where poor nutrient food causes growth stunting, blindness, low work capacity, premature death and mental retardness. Biofortification of maize, sweet potato, cassava and rice are already underway that help to achieve the goal of sustainable agriculture. The impressive progress in developing biofortified crops has been made of micronutrient richness across an array of major cereal crops. Biofortified varieties have been developed through the conventional breeding and advance breeding techniques.

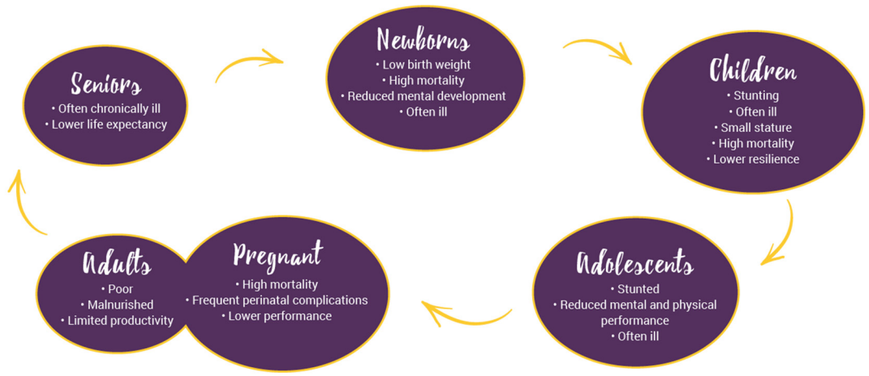
The mechanism for improving nutrient status in biofortified crops is quite simple and effective. These crops having similar physiology as compared to non-fortified crops but acquiring dense and desired nutrients compositions. These assuming more micronutrient bioavailability, high storage, better absorption with a diet limited in sufficient nutrients amount harbours in staple crops.

Many promising results showed from worldwide on use of biofortified consuming food

- Consumption of Iron biofortified pearl millet has increased that decreased the iron deficiency in school children of India.
- Iron biofortified rice has improved the reproductive age health in women of Philippine.
- Biofortified based sweet potato (orange) improve vitamin A deficiency in Uganda, South-Africa, Mozambique, Kenya, Zambia and Bangladesh.

Approach toward nutrient rich diet on table

Hidden hunger is the major issue that hits economy of every nation in indirect way (deficiency diseases of zinc, iron, vitamin B9, folate and vitamin A). The inadequate energy due to quality diets using staple cereals, but to fulfill bioavailability of consuming expensive vegetables, fruits pulses, nuts and meat are quite expensive and unaffordable alternatives for common people. However, using supplement foods often not be a permanent solution to reach every needful community.



During such kind of pandemics like Covid19, the rural communities are more susceptible and staple crop are need to be bio-fortified in order to improve the nutritional status of poor population. More than 12-24% preschool mortality observed due to deficiency of Vitamin A that overcome by Vitamin A rich capsule (estimated cost US$ 10-15). Nearly one out of four preschool children suffers from Zn deficiency, one of the major causes of poor brain development and their functional responses. The Zn deficiency creates stunting as well cause megaloblastic anemia and neural tube defects (NTDs) in aggregative form with folate measured an underestimated form of malnutrition. In collaboration, CIP and HarvestPlus and their combined efforts provides releases more than 300 biofortified varities (improved iron, provitamin A and zinc) using conventional methods that have been approved by more than 40 countries and successfully released by 20 nations at commercial level after field and labs trials.

Challenges for adaptability of biofortified varieties at farmer levels

Farmers are fascinated in planting new varieties that are superior in yield and diseases resistant, but more toward stress tolerance. Crops with poor agronomical traits and rich in micronutrients concentration will be a challenge for farmer to adopt them. However, biofortified cultivars must be superior or equivalent traits to the low nutrient dense markets and local's varieties of crops with which they will compete. Thus, motivating consumer for consuming colored food and changing their habit for buying or eating food with new secondary properties such as taste, shape, colour, and flavor is a difficult task. However, Provitamin A carotenoids impart colour to crop such as cassava, orange fleshed maize and sweet potato has been already neglected by communities. The acceptability has been based on convincing the information regarding health benefits for consuming biofortified crop. The misconception based on identical techniques used for developing biofortified and genetic modified crop is also a matter of concern. Moreover, the focus on conventional breeding techniques for enhancing desired nutritional value need more focus work with products stability. Therefore, functional regulatory framework for consumer confidence in developing biofortified crop through genetic engineering will take much time until these new crop products reach the consumer level. The 70% dropping in Vitamin A content within 6 months was observed in B-carotene corn and rice reported in Zambia. Post-harvest degradation or reducing micronutrients contents with time is a major challenge that halts our sustainable food goal.

CONCLUSION

The release of new 17 biofortified varieties might be a plausible antidote to mitigate problem of hidden hunger in India. The vision of Indian agricultural universities and associated agencies is clear, that ultimately they come in front to the cope up the challenges of hidden hunger via developing varieties, having density of mineral and vitamins. Such decision on implementing scientific hardworks from labs to field solely driven by policymakers and governments that require determination to eradicates the problem of nutrient malnutrition's. These humanitarian efforts enveloped with scientific and educational validations act as cornerstone to uplift human health and bring about sustainable global peace. Super-nutritious food could help billions of plates to gain every nutrient in single diet. Tomorrow, we are imagining our future with free of poverty and hidden hunger.