

Biofortification - A Present Need of Agriculture

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Abstract

The process of breeding crops into highly nutritious food crops, to provide an unceasing, long-term strategy for delivering micronutrients to rural populations in developing countries is known as biofortification. Biofortification is an attainable and economical means of bringing micronutrients to populations that may have limited access to diverse diets and other micronutrient intervention. It is necessary to enhance mineral absorption in vivo from cereal-based diets. Genetic engineering as well as conventional and modern breeding approaches are being used for biofortification of agricultural crops. It is a good pathway to remove hidden hunger from many suffering poor peoples.

Keywords:-Biofortification, Conventional breeding, Genetic engineering, Hidden hunger, Micronutrients

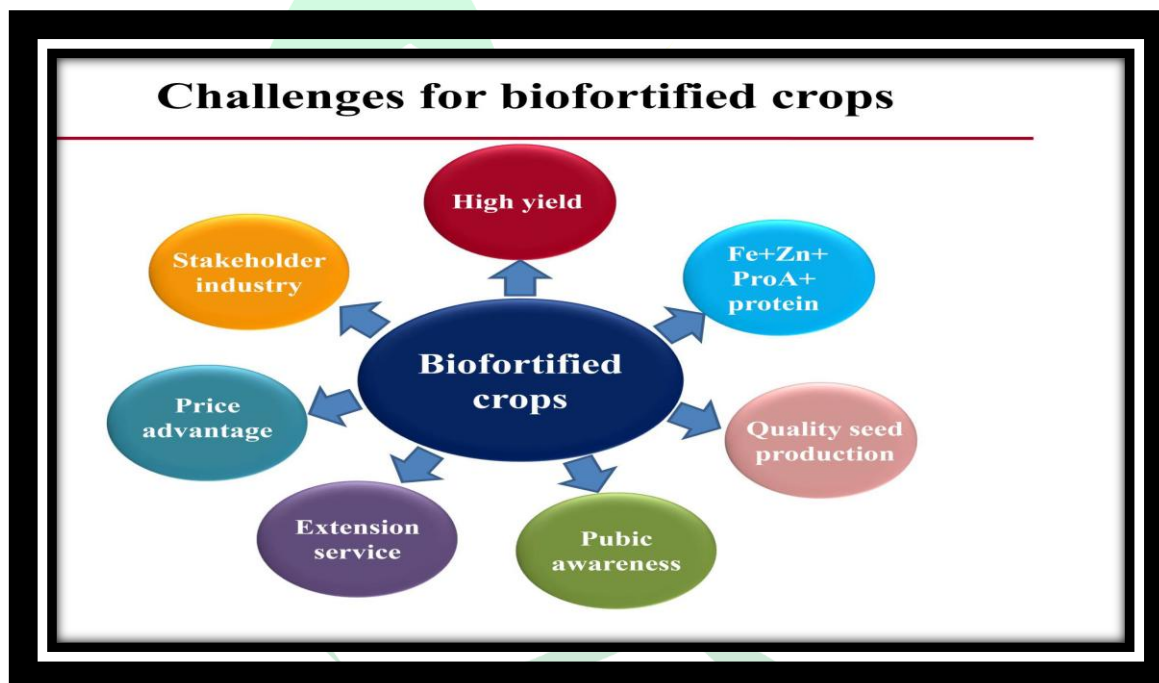
Introduction:-

Biofortification is the development of nutrient-dense staple crops using the best conventional breeding practices and modern biotechnology, without sacrificing agronomic performance and important consumer-preferred traits. Good nutrition is essential for health, survival and reproduction. Humans require 44 known nutrient in adequate amount and consistently to live healthy and productive lives. Billions of peoples in resource poor families in developing countries suffer from an insidious form of hunger known as micronutrient malnutrition,(Fe, Zn, I and Vit. A deficiency). (At present 2 billion peoples are malnourished out of 795 million peoples are undernourished worldwide. Children's (<5 years) 149 million stunted, 45 million wasted and 39 million are overweight. JME (UNICEF-WHO-WB) 2021). High rate of malnutrition cause 4-5% loss in global GDP (FAO,2021). India's rank 101 out of 116 countries in global hunger index (GHI,2021). To fight with nutrient deficiency especially

minerals, various interventions such as food diversification, pharmaceutical supplementation, and biofortification have been underscored (Kumar *et al* 2019). There are many biofortified crop varieties released such as Vit. A enriched rice, Fe and Zn enriched wheat lysine and tryptophan enriched maize, carotene enriched cauliflower, Ca and Fe enriched spinach, Vit. C enriched tomato, bathua and mustard etc (Yadav *et al.*2017).

Pre-requisite for biofortification :-

- Availability of sufficient genetic variability within the Gene pool of the species.
- A relative stability of the trait across various edaphic environments and climatic zones.



Methods:-

Selective breeding:

- ❖ These programmes search for variation in the characteristic of interest, for example higher iron content, within existing varieties of the crop.
- ❖ This characteristic is then bred into cultivated varieties by crossing and selecting those individual plants with the desired characteristics.
- ❖ In selective breeding, scientists use:
 - Seedbank**-collections of seeds usually collected in the past, which may have greater genetic variation than current varieties;

Widecrosses—inter-breeding between a cultivated species and another, normally closely-related, species.

Genetic engineering:

- ❖ Genetic engineering is a method through which we insert gene of interest in a crop which increase nutrient content of crop.
- ❖ Genetic engineering allow to move desired gene from one plant to another plant which gives chance to insert desirable gene in plant.

Advantages :-

1. Biofortification helps in achieving overall health improvement in the people.
2. Biofortified crops are more resilient to diseases, pests, droughts, etc and provide better yield.
3. It is cost effective means (one time investment).
4. It offers a food based sustainable and low dose alternative to essential nutrient supplements.
5. Biofortified crops are more efficient than fortified products.

Conclusion :-

- Instead of fortification, the addition of nutrient, minerals and vitamins by biofortification in crops is more permanent solution of reducing malnutrition and also economically more affordable to economically weaker families than fortified produce.
- Biofortified crops gives balance nutrition to resource poor families.

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