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Crop Biofortification: An Effective Approach to Mitigate Malnutrition

(*Munnesh Kumar and Kana Ram Kumawat)
Rajasthan State Seed and Organic Certification Agency, Jaipur, Rajasthan-302005
*muneshbhu94@gmail.com

Bio-fortification: Greek word "bios" means "life" and Latin word "fortificare" means "make strong".

Bio-fortification:

- Biofortification is a method of breeding crops to increase their nutritional value
- Bio-fortification refers to increasing genetically the bio-available mineral content of food crops (Brinch-Pederson *et al*., 2007).
- Bio-fortification differs from ordinary fortification because it focuses on making plant foods more nutritious as the plants are growing, rather than having nutrients added to the foods when they are being processed.

Biofortification is comparatively inexpensive, cost effective, sustainable, long term means of delivering more micronutrients to poor people's food which they usually eat in their diet (Saltzman *et al.*, 2013). In human malnutrition is mostly understood to mean chronic hunger (Stein, 2010) and fighting hunger not only represents one of the foremost challenges for humanity but also offers considerable economic and social returns (FAO, 2008; Horton *et al.*, 2008). The lack of micronutrient in the body is also called as hidden hunger (Allen, 2003) because people who suffer from it do not feel any symptom of its lacking and its consequences are often not visible. One in three people in the world suffer from hidden hunger, caused by a lack of minerals and vitamins in their diets, which leads to negative health consequences (Kennedy *et al.*, 2003; Saltzman *et al.*, 2013).

Importance of crop Biofortification

- ✓ To overcome the mal-nutritions in human beings
- ✓ To increment of nutritional quality in daily diets
- ✓ To improvement of plant or crop quality and increment of variability in germplasm
- ✓ Biofortification for important crop plants through biotechnological applications is a *cost-effective and sustainable solution for alleviating VAD, etc.,*.

Methods of crop Biofortification

1. Agronomical approaches:- Provide temporary micronutrient increases through fertilizers. It includes foliar application, broadcasting etc.
2. Conventional approaches:- Hybridization between the parental lines with desired vitamin and mineral content over several generation and selection of the desired plant with desired amount of nutrients and good agronomic performance provides an effective way of nutrient insertion in crop plants.
3. GMO Approaches:- Transgenic approaches are useful when the required nutrient itself or the sufficient amount of the nutrient is not naturally available in the crop.

Future thrust

At present various projects are going on to conduct research on biofortified crops. HarvestPlus project for Fe, Zn and beta-carotene content in rice, wheat, maize, cassava, sweet potato and beans; Harvest Zinc for higher Zn content in wheat; Golden Rice Project for beta-carotene content in rice, African Biofortified Sorghum Project for Fe, Zn, vitamin A and vitamin E; BioCassava Plus for Fe, Zn, vitamin A, vitamin E and protein content; Biofortification of bananas for Fe, provitamin A and vitamin E content are going on which will proved to be useful tool to fight with major challenges of global food security

Conclusion

- For a country like India, with diverse agroclimatic and soil situations, need to develop a number of QPM hybrids of different maturity groups, *viz*. early, medium and late (full season).
- However, the major constraints in adoption of the QPM hybrids in these areas are the non-availability of hybrid seeds and lack of incentives like premium price for the QPM over normal maize grains.
- There is also a need to create awareness among the consumers and industry for its use in food and feed.
- We are developing a linkage between the seed producers, farmers and the industry to bring about the much needed synergy in development and utilization of QPM that will help in reducing protein malnutrition.

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