Lentil Genetic Biofortification

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What is Genetic Biofortification??

Genetic Biofortification- It is the process of increasing the bioavailable concentrations of an element in edible portions of crop plants through genetic selection or genetic engineering.

Micronutrient deficiency affects more than two billion population worldwide. The micronutrient deficiency in human body is commonly described as "hidden hunger". Genetic biofortification of food crop varieties with micronutrients is one of the potential means to combat micronutrient deficiencies through crop breeding techniques.

Why lentil is ideal for Biofortification???

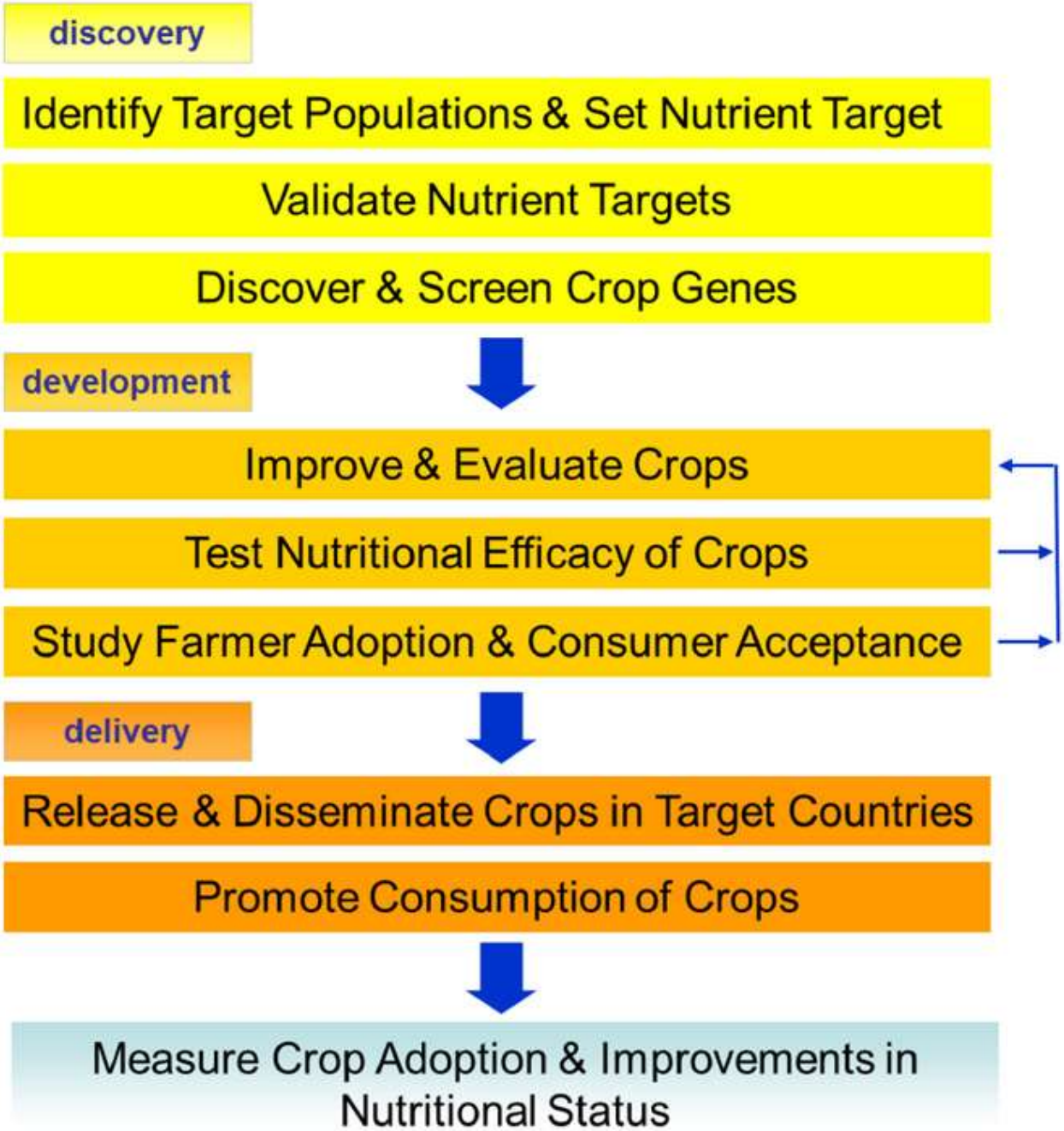
- Grain legumes constitute the prime source of vegetarian diet in the developing world.
- On the basis of beneficial nutrient profiling, lentils have been identified as one of the five healthiest foods in the world.
- Lentils are rich sources of protein, micronutrients and vitamins including iron, zinc, selenium, folates, carotenoids and antioxidant components.
- Lentil genetic resources including germplasms and wild species showed genetic variability for these traits, so this variability can be used for improvement in bioavailable concentration of micronutrients through hybridization or selection.
- 100 g serving of lentil grain can provide 41−113% of the recommended daily allowance (RDA) of Fe, 40−68% of Zn, folate (54-73 %) and 77−122% of Se. Besides, lentil is rich in β-carotene concentration (2−12 μg/g).

Table 1. Nutrient Profiling of Lentil Seeds

Protein	**20–25 %**
Carbohydrate	**50–60 %**
Fat	**0.7–0.8 %**
Ca	**60–70 mg/100 g**
Fe	**7–9 mg/100 g**
Zn	**4–5 mg/100 g**
Se	**42–67 μg/100 g**

Folate	**261–290 µg/100 g**
ß- carotene	**200-1200 µg/100 g**

Fig. 1 Strategy to Develop Biofortified Cultivars



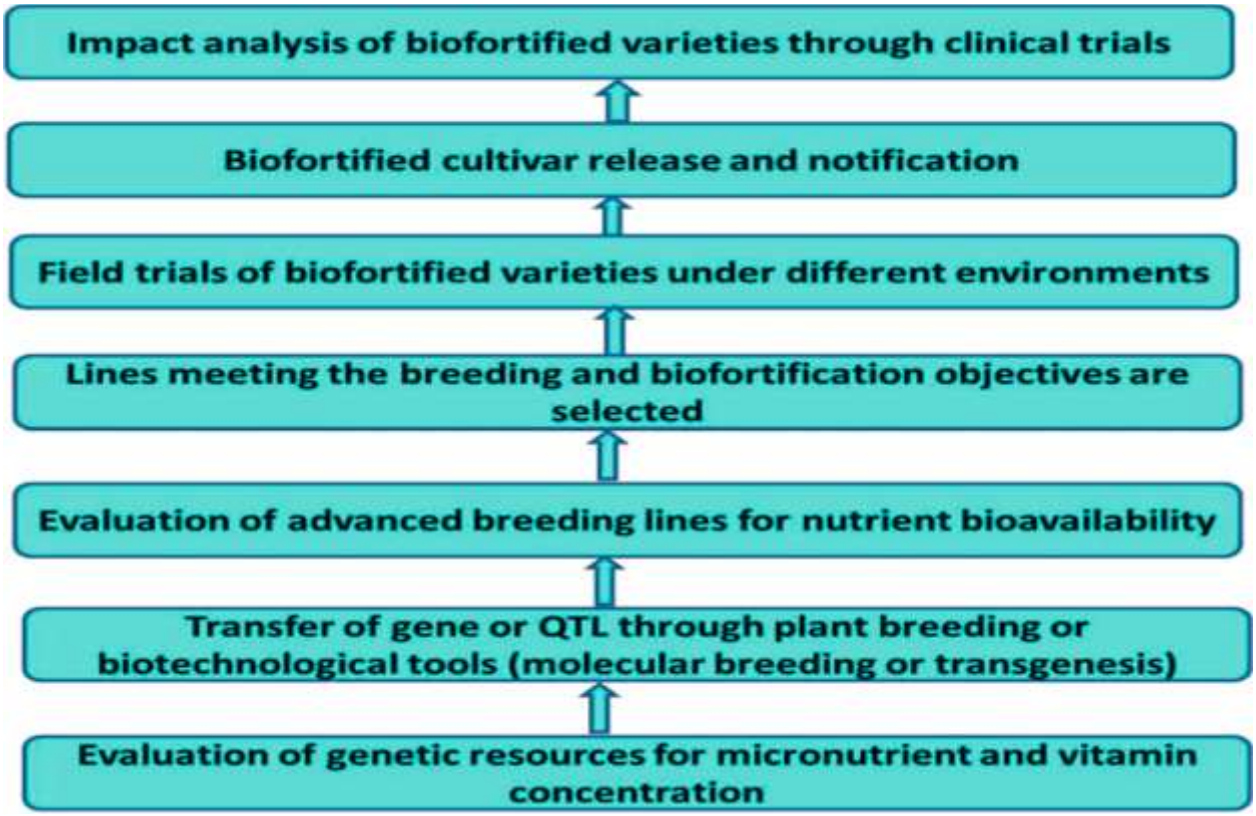


Table 2. Biofortified Cultivars for Fe and Zn

Bangladesh	**Barimasur-4, Barimasur-5, Barimasur-6, Barimasur-7, Barimasur-8**
Ethiopia	**Alemaya**
India	**Pusa Vaibhav**
Nepal	**Khajurah-1, Khajurah-2, Shital, Sisir, Shekhar, Simal**
Syria	**Idlib-2 , Idlib-3**

CONCLUSION

Lentil being a nutritious grain legume crop provides an appropriate candidate crop for nutritional enrichment. Crop breeding techniques remain cost effective and accessible, providing solutions to the growing problem of food insecurity worldwide. Identified QTLs controlling micronutrient further can be used in Marker assisted breeding to develop micronutrient rich varieties.