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Opinion Article

Biofortification methods in improving nutritional value to crops

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DESCRIPTION

Biofortification is the idea of breeding crops to boost their nutritional worth. This can be accomplished using either conventional selective breeding or genetic engineering. Biofortification varies from ordinary fortification in that it focuses on improving the nutritional value of plant foods while they are still growing, rather than adding nutrients to the foods when they are being processed. When it comes to supplying nutrients for the rural poor, who rarely have access to commercially fortified foods, this is a significant improvement over ordinary fortification. As a result, biofortification is seen as an upcoming strategy for dealing micronutrient deficiencies in low- and middle-income nations. In the case of iron, the WHO estimates that biofortification could aid in the treatment of the 2 billion individuals who suffer from anaemia caused by iron deficiency.

Plants are propagated in one of two ways. There are Selective breeding, Genetic modification, Seed Priming. Using Selective breeding, Plant breeders for existing types of crops that is naturally high in nutrients in seed or germplasm banks. They then crossbreed these high-nutrient types with high-yielding varieties of crops to provide a seed with both high yield and nutritional value. To have a measurable positive impact on human health, crops must be bred with sufficient amounts of nutrients. As a result, nutritionists must be involved in their development, as they must determine if consumers of the improved crop can absorb the additional nutrients, as well as the extent to which storage, processing, and cooking of the crops affect their available nutrient levels. This method is prevalent at present, as it is less controversial than genetically engineering crops. HarvestPlus, a major non-governmental organisation involved in the development of biofortified crops, primarily use conventional breeding techniques and has not yet spent more than 15% of its research budget on genetically modified crops when traditional methods fail to meet nutritional requirements.

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Genetic modification is a method in which Golden rice is a GM crop developed for its nutritional value. The most recent type of golden rice contains genes from the common soil bacterium Erwinia as well as maize, and has higher levels of beta-carotene, which the body may convert to vitamin A. Golden rice is being researched as a new technique to combat vitamin A deficiency.

Seed Priming is another method used in the process of growing plants by adding nutritional value. According to one report, it is possible to “prime” seeds before sowing them by bombarding them with iron oxide nanoparticles. This strategy would cause wheat plants to absorb more iron, increasing the nutritional value of the grains.

Micronutrient deficiencies, such as vitamin A, zinc, and iron, are frequent in low and middle-income nations, affecting billions of people. These can cause a higher prevalence of blindness, a weakened immune system, reduced growth, and impaired cognitive development, among other symptoms. The poor, particularly the rural poor, eat a diet high in these micronutrients but low in staple crops like rice, wheat, and maize, and most cannot afford or efficiently farm enough fruits, vegetables, or meat products to achieve adequate levels of these nutrients. As a result, raising micronutrient levels in staple crops can help prevent and reduce micronutrient deficits – one study in Mozambique found that eating sweet potatoes biofortified with beta-carotene reduced the incidence of vitamin A deficiency in children by 24%.This approach may have advantages over other health initiatives such as providing fortified foods after processing or providing supplements. Although these approaches have been helpful in dealing with the urban poor, they frequently necessitate access to functioning markets and healthcare systems, which are often lacking in rural areas. After an initial large research investment, biofortification is also fairly cost effective – where seeds can be distributed, “implementation costs are nil or negligible,” as opposed to supplementation, which is comparatively expensive and requires ongoing funding over time, which may be jeopardised by fluctuating political interest. Research on this approach is being undertaken internationally, with major efforts ongoing in Brazil, China and India.