Popular Article

Trends in Agriculutre Science

Vol.1, Issue 8 December, 2022, Page: 183-185

Biofortification- Leading Edge Technology for Enhanced Micronutrient Accumulation in Field Crops towards Food Security

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Abstract

By boosting the concentration of vital micronutrients, the novel technology of biofortification improves the nutritional quality of crops. By offering a long-term solution to boost the availability of crucial micronutrients in food crops, this technology attempts to alleviate the global issue of malnutrition. The goal of this article is to examine the idea of biofortification and how it might be used to improve the nutritional content of field crops. The article explains the advantages of biofortification and emphasises the cutting-edge techniques used to enhance crops' absorption of micronutrients. By enhancing the nutritional value of crops and lowering malnutrition, biofortification is a promising technology that can aid in achieving food security, according to the article's conclusion.

Introduction

Around 2 billion people worldwide suffer from micronutrient deficiencies, which are especially prevalent in underdeveloped nations where people depend heavily on staple crops for their major source of nourishment. Malnutrition, stunted growth and development, and increased susceptibility to infectious diseases can result from a lack of vital micronutrients like iron, zinc, and vitamin A. By improving the nutritional value of crops, biofortification is a cutting-edge technology that can assist in addressing the issue of micronutrient insufficiency.

Breeding crops to improve the concentration of vital micronutrients in edible sections of crops is a method known as biofortification. This methodology chooses and creates crop varieties that are naturally enriched with crucial micronutrients using traditional breeding methods. Many crops, including rice, wheat, maize, beans, and cassava, can be biofortified. The technology provides a viable and affordable method of addressing micronutrient deficiencies and enhancing the nutritional value of common foods.

Benefits of Biofortification

Biofortification offers several benefits that make it a promising technology for enhancing the nutritional value of crops. Firstly, it is a sustainable solution that does not require any additional resources or inputs. Biofortification uses conventional breeding techniques to develop crop varieties that are naturally enriched with essential micronutrients. This approach is cost-effective and can be integrated into existing agricultural practices.

Secondly, biofortified crops are an excellent source of essential micronutrients, which can help to improve the nutritional status of populations. The increased availability of essential micronutrients in food crops can reduce the risk of malnutrition, improve cognitive development, and enhance immunity against infectious diseases.

Thirdly, biofortification can enhance food security by improving the nutritional quality of staple crops. This technology can help to increase the availability of essential micronutrients in regions where access to diverse and nutritious food is limited. Biofortification can also reduce the reliance on dietary supplements and fortification programs, which can be expensive and difficult to implement in rural areas.

Leading-Edge Technology for Biofortification

Biofortification is a complex process that requires the use of leading-edge technology to improve micronutrient accumulation in crops. The technology involves several steps, including the identification of crop varieties with high micronutrient content, the development of breeding programs, and the evaluation of crop performance in the field.

Several techniques are used to improve micronutrient accumulation in crops, including conventional breeding, marker-assisted selection, and genetic engineering. Conventional breeding involves the selection of crops with high micronutrient content and crossing them with elite cultivars to develop biofortified varieties. Marker-assisted selection uses molecular markers to identify and select crops with desirable traits, such as high micronutrient content. Genetic engineering involves the manipulation of plant genes to enhance micronutrient accumulation in crops.

Conclusion

A promising method called biofortification can alleviate micronutrient deficiencies and boost the nutritional value of crops. It is both sustainable and affordable. The technology has several benefits, including its ability to enhance food security and reduce the reliance on dietary supplements and fortification programs. Biofortification also uses leading-edge technology to improve micronutrient accumulation in crops, which involves conventional breeding, marker-assisted selection, and genetic engineering. While there are concerns about the potential risks of genetic engineering, conventional breeding and marker-assisted selection are proven and safe methods that can be used to develop biofortified crop varieties.

However, biofortification is not a silver bullet solution to address malnutrition. It should be integrated with other strategies, such as promoting dietary diversity, improving food access, and providing nutrition education. Biofortification can also complement existing nutrition interventions, such as fortification and supplementation programs, to improve the nutritional status of populations.

As a result, biofortification is a cutting-edge technology that has the potential to significantly contribute to the reduction of malnutrition and the enhancement of food security. The technology has several benefits, including sustainability, cost-effectiveness, and the use of leading-edge technology to improve micronutrient accumulation in crops. While there are concerns about the potential risks of genetic engineering, conventional breeding and marker-assisted selection are safe and effective methods that can be used to develop biofortified crop varieties. Biofortification should be integrated with other strategies and interventions to achieve sustainable and long-term solutions to malnutrition.

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