Agri Express: **02** (01), ***Article No***. V02I01.11 ***E - ISSN No. 2584 - 2498***

BIOFORTIFICATION OF HORTICULTURAL CROPS

[1]I. Raja Sri Charan, [2]P. Jyothish Datta and [3]Advait Prasad Dash

ITM University, Gwalior

Corresponding author: adsrv231002@gmail.com

ABSTRACT

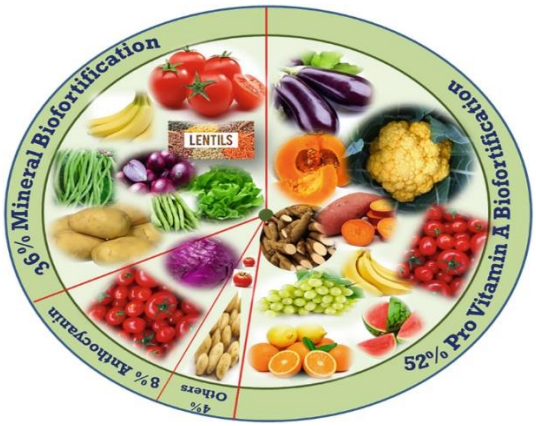
Biofortification of horticultural crops is an eminent strategy to address global malnutrition by increasing the nutritional content of fruits, vegetables, and ornamental plants. This process involves breeding crops to increase their levels of vital nutrients, such as vitamins, minerals, and phytochemicals. While biofortification has been successful in staple crops, horticultural crops present unique challenges due to their genetic diversity. Strategies like-conventional breeding, genetic engineering, soil management, and post-harvest processing can be employed to biofortify horticultural crops.

Keywords: Biofortification, Malnutrition, Phytochemicals, Breeding, Post-harvest

INTRODUCTION

Biofortification of horticultural crops involves various techniques, such as selecting, breeding plants with naturally higher nutrient levels, using fertilizers containing essential nutrients, and employing modern biotechnological methods like genetic engineering. These approaches can help increase the levels of key nutrients like vitamin A, iron, zinc, and others in horticultural crops, making them more nutritious.

One of the advantages of biofortification is its sustainability, as it can be integrated into existing agricultural practices without the need for major changes in farming systems. This makes it a cost-efficient and environmentally friendly approach in improving nutrition.



STRATAGIES FOR BIOFORTIFICATION

Biofortification can be attained through several strategies, including conventional plant breeding, genetic engineering and agronomic practices. Conventional plant breeding involves choosing and crossing plants with naturally high nutrient levels to develop new variations with improved nutritional content. Genetic engineering, on the other hand, involves inserting genes responsible for nutrient accumulation into crops to enhance their nutritional value. Agronomic practices, such as fertilization and irrigation, can also be used to enhance nutrient uptake and accumulation in crops.

IMPACT ON NUTRITIONAL QUALITY

Numerous studies have demonstrated the effectiveness of biofortification in enhancing the nutritional quality of horticultural crops. For example, biofortified varieties of tomatoes, carrots, and sweet potatoes have been developed with higher levels of vitamin A, iron, and zinc, respectively. These biofortified crops have been shown to significantly improve

the nutritional status of populations that consume them regularly, leading to reduced rates of nutrient deficiency and related health problems.

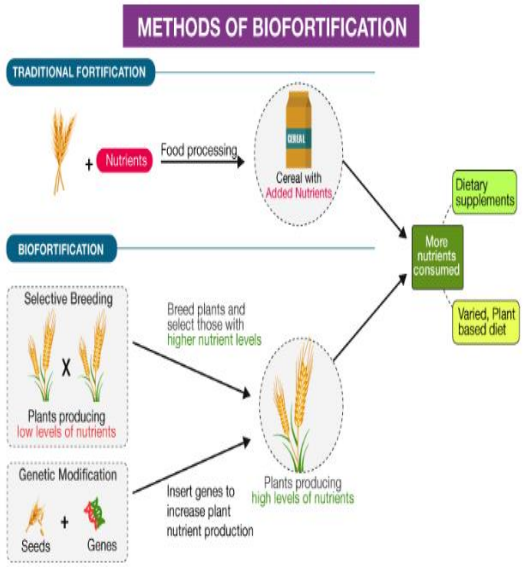
1.Increased Levels of Key Nutrients:
Biofortified horticultural crops have been developed with higher levels of key nutrients, such as vitamin A, iron, zinc, and folate. For example, biofortified varieties of sweet potatoes have been shown to contain up to 90% more vitamin A than traditional varieties, while biofortified beans have been developed with up to 80% more iron.

2. Improved Nutritional Status:
Consumption of biofortified horticultural crops has been linked to improved nutritional status in global population that rely on these crops as dietary staples.

*For example, studies have shown that children who consume biofortified crops have high levels of key nutrients in their blood (body), which leads to reduced rates of nutrient deficiency & related health problems.

METHODS FOR BIOFORTIFICATION OF HORTICULTURAL CROPS

Biofortification of horticultural crops involves enhancing the content of essential nutrients like vitamins and minerals in these crops.



There are several methods used for biofortification, including:

1. ***Conventional Breeding*:** Traditional breeding methods are used to develop varieties with higher nutrient content. This involves selecting plants with desirable traits and crossing them to produce offspring with the desired characteristics.
2. ***Genetic Engineering:*** Genetic engineering methods are used for introgression of specific genes into plants to enhance their nutrient content. For example, genes responsible for producing vitamins or minerals can be inserted into crops to increase their nutritional value.
3. ***Fertilization:*** Application of fertilizers containing micronutrients can increase the nutrient content of horticultural crops. This method is particularly effective in addressing specific micronutrient deficiencies in soils.
4. ***Biofortified Fertilizers:*** Specialized fertilizers containing micronutrients can be applied to crops to increase their nutrient content. These fertilizers are designed to better the uptake and utilization of nutrients by plants.
5. ***Soil Management:*** Improving soil health through methods like crop rotation, cover cropping, and organic matter addition can enhance the nutrient content of horticultural crops.

CONCLUSION:

The conclusion for biofortification of horticultural crops can highlight the significant potential of this approach in addressing malnutrition and improving human health. It can emphasize the importance of selecting appropriate crops, techniques, and target nutrients based on regional needs and agricultural practices. Additionally, it can stress the need for continued research and investment in biofortification to make it more accessible and effective in combating nutrient deficiencies globally.

REFERENCES:

1. https://www.krishisewa.com/miscellaneous-articles/1045-role-of-biofortification-through-crop-improvement.html
2. https://www.frontiersin.org/articles/10.3389/fnut.2018.00012/full
3. https://chesci.com/wp-content/uploads/2017/07/V6i22_87_CS042048053_Irene_1227-1237.pdf
4. Welch, R. M., & Graham, R. D. (2004). Breeding for micronutrients in staple food crops from a human nutrition perspective. Journal of Experimental Botany, 55(396), 353-364.
5. Bouis, H. E., & Saltzman, A. (2017). Improving nutrition through biofortification: A review of evidence from Harvest-Plus, 2003 through 2016. Global Food Security, 12, 49-58.
6. Pic 1(page-1)-Source: Springer Link.com, Pic 2(page-3)-Source: Byju's.in.

*****